105th Congress, 1st Session – – – – – – – – – – – – – House Document 105–65

PORT OF LONG BEACH, CALIFORNIA

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS) THE DEPARTMENT OF THE ARMY

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY DATED JULY 26, 1996, SUBMITTING A REPORT ON THE PORT OF LONG BEACH, CALIFORNIA TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, PURSUANT TO PUB. L. 104–303, SEC. 101(a)(4) (110 STAT. 3663)

APRIL 14, 1997.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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U.S. GOVERNMENT PRINTING OFFICE

39–785 WASHINGTON : 1997

105th Congress, 1st Session – – – – – – – – – – – – – House Document 105–65

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PORT OF LONG BEACH, CALIFORNIA

CONTENTS

APPENDICES ACCOMPANYING THE REPORT OF THE DISTRICT ENGINEER

[ONLY APPENDIX E PRINTED]

LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

REPLY TO ATTENTION OF

24 MARCH 1997

Honorable Newt Gingrich
Speaker of the House
of Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

Section 101(a)(4) of the Water Resources Development Act (WRDA) of 1996, authorized a deep-draft navigation project for the Port of Long Beach, California. The Secretary of the Army supports the authorization and plans to implement the project through the normal budget process.

The authorized project is described in the report of the Chief of Engineers dated July 26, 1996, which includes other pertinent reports and comments. The views of the State of California and the Department of the Interior are set forth in the enclosed reports. These reports are also in final response to Section 201(b) of WRDA 1986, Section 4 of WRDA 1988, and Section 102 of WRDA 1990.

Section 201(b) of WRDA 1986 authorized the deepening of channels at the Port of Long Beach, subject to a final report of the Chief of Engineers and with such modifications as are recommended by the Secretary of the Army. Section 201(b) also specified that no construction may be initiated until a report is issued and approved by the Secretary. This report and recommendations complete the action required by Section 201(b) of WRDA 1986.

Section 4 of WRDA 1988, as amended by Section 102 of WRDA 1990, authorized the Secretary of the Army to credit non-Federal interests for the Federal share of work they accomplish that is associated and compatible with the project recommended by the Chief of Engineers and approved by the Secretary.

The authorized project provides for deepening the entrance channel, interior channels, and turning basin at the Port of Long Beach to a depth of 76 feet below mean lower low water (MLLW). The authorized project is the national economic development plan and includes a credit for work already accomplished by the Port of Long Beach. The Port has already deepened the main channel, interior channels, and the turning basin as part of its Pier J Expansion Project. Uncompleted work includes deepening the 1200-foot-wide entrance channel from the Long Beach Breakwater seaward for a distance of about 2 miles. Material dredged from the new work would be placed in nearshore borrow pits and at Pier 400. Non-Federal interests would construct a pipeline and several crude oil storage tanks necessary to unload the deeper draft vessels. This work is needed to realize project benefits. No fish and wildlife or cultural resources mitigation is required.

Based on October 1995 price levels, the total first cost of implementing both the completed and uncompleted portions of the project is about $55,450,000. The total first cost of the uncompleted portion, the portion authorized by Section 101(a)(4) of WRDA 1996, is about $37,290,000. The cost of the work already accomplished by the Port of Long Beach, the portion authorized by Section 201(b) of WRDA 1986, is about $18,160,000.

The total first cost of the uncompleted portion of the project includes about $17,120,000 for general navigation features; about $110,000 for Federal aids to navigation; about $60,000 for non-Federal lands, easements and rights-of-way, and relocations; and about $20,000,000 for non-Federal construction of a pipeline and crude oil storage tanks. The Federal share of the first costs of the uncompleted portion of the project is estimated at about $14,320,000, and the non-Federal share is estimated at about $22,970,000. The non-Federal share includes the additional 10 percent non-Federal share of the general navigation features required by Section 101 of the Water Resources Development Act of 1986. Both the Federal and non-Federal cost sharing reflect a credit to the Port of Long Beach for the Federal share of work already completed by the Port. The work accomplished by the Port has been determined to be compatible with the project, and the Federal share of such work is estimated at about $7,300,000.

Implementation of the project will be subject to certain non-Federal cost sharing, financing, and other applicable items of local cooperation that are described on pages 2 through 5 of the report of the Chief of Engineers. Implementation will be further subject to the non-Federal sponsor agreeing to:

- Pay during subsequent maintenance, one-half of the excess of the cost of operation and maintenance of the general navigation features of the project over the cost of which the Government determines would be incurred for operation and maintenance if the project has a depth of 45 feet below mean lower low water (MLLW);

- Prohibit erection of any structures or berthing of any vessels that would encroach on the authorized general navigation features;

- Assume responsibility for construction and installation of all non-Federal features, concurrent with the construction of the general navigation features, including additional pipelines and storage tanks; and,

- Ensure that lands created by the project are retained in public ownership for uses compatible with the authorized purposes of the project, and regulate the use, growth, and development on such lands to those industries whose activities are dependent upon water transportation.

The Office of Management and Budget advises that there is no objection to the submission of the report to the Congress. The project, as modified by the Secretary of the Army, is consistent with the program of the President. A copy of its letter is enclosed in the report.

Sincerely,

H. Martin Lancaster

H. Martin Lancaster
Assistant Secretary of the Army
(Civil Works)

Enclosure

COMMENTS OF THE OFFICE OF MANAGEMENT AND BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

JAN 15 1997

The Honorable H. Martin Lancaster
Assistant Secretary of the Army
for Civil Works
Pentagon - Room 2E570
Washington, DC 20310-0103

Dear Mr. Lancaster:

As required by Executive Order 12322, the Office of Management and Budget has completed its review of your September 16, 1996, report on Port of Long Beach, California.

The Administration supports authorization of this project for construction in accordance with your recommendation. The Office of Management and Budget does not object to your submitting this report to Congress.

Sincerely,

T. J. Glauthier
Associate Director
Natural Resources,
Energy, and Science

COMMENTS OF THE STATE OF CALIFORNIA

The Resources Agency of California

Pete Wilson
Governor

Douglas P. Wheeler
Secretary

California Conservation Corps • Department of Boating & Waterways • Department of Conservation
Department of Fish & Game • Department of Forestry & Fire Protection • Department of Parks & Recreation • Department of Water Resources

May 8, 1996

U. S. Army Corps of Engineers
Policy Review Branch
Policy Review and Analysis Division
ATTN: CECW-AR (SA)
7701 Telegraph Road
Alexandria, Virginia 22310-3861

The State has reviewed the Port of Long Beach Main Channel Deepening Final Feasibility Study and Environmental Impact Statement, Los Angeles County, submitted through the Office of Planning and Research.

We coordinated review of this document with the California Coastal, Native American Heritage and State Lands Commissions; the Integrated Waste Management, and Los Angeles Regional Water Quality Control Boards; and the Departments of Fish and Game, and Transportation.

None of the above-listed reviewers has provided a comment regarding this document. Consequently, the State will have no comments or recommendations to offer.

Thank you for providing an opportunity to review this document.

Sincerely,

Yodell A. Loyon
for Maureen F. Gorsen
Assistant General Counsel

cc: Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814
(SCH 95064017)

COMMENTS OF THE DEPARTMENT OF THE INTERIOR

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

ER 96/101

MAY 3 0 1996

Mr. David B. Sanford, Jr.
Chief, Policy Review and
Analysis Division
Policy Review Branch
ATTN: CECW-AR (SA)
7701 Telegraph Road
Alexandria, Virginia 22315-3861

Dear Mr. Sanford:

The Department of the Interior has reviewed the proposed Chief of Engineers report for Long Beach Main Channel Deepening, California. We do not object to the proposed plan, and we do not have any comments on the report.

Sincerely,

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

PORT OF LONG BEACH, CALIFORNIA

REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CECW-PE (10-1-7a) 26 JUL 1996

SUBJECT: Port of Long Beach, San Pedro Bay, California

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on improvements to the existing navigation project at the Port of Long Beach, California. It is accompanied by the reports of the district and division engineers. These reports are in final response to a series of Congressional resolutions dating back to May 1967 directing the U.S. Army Corps of Engineers to promote and encourage the efficient, economic, and logical development of the Los Angeles and Long Beach Harbors, and to provisions contained in the Water Resources Development Acts of 1986, 1988, and 1990, wherein construction of navigation improvements by the Corps and crediting of construction costs for navigation improvements completed by the Port of Long Beach were authorized, subject to approval by the Secretary. Preconstruction engineering and design activities for the Port of Long Beach will be continued under the authority provided by Section 201 of the Water Resources Development Act of 1986 (Public Law 99-662) as amended.

2. The reporting officers recommend deepening the approach and entrance channels and turning basin from -60 feet mean lower low water (MLLW) to -76 feet MLLW. The recommended plan includes incorporating the channel deepening work completed by the Port of Long Beach as part of its Pier J Expansion Project (the completed portion) plus the new dredging required from the breakwater seaward to complete the deeper navigation access (uncompleted portion). Dredged material from the new dredging would be placed in nearshore borrow pit areas and Pier 400. The recommended plan would reduce waterborne transportation costs by minimizing the need for light loading of bulk shipments and by encouraging the use of larger and more efficient transport vessels. No mitigation is required. The recommended plan is the national economic development (NED) plan and is the plan preferred by the non-Federal sponsor.

3. Based on October 1995 price levels, the Government estimate of the total cost of the recommended plan (completed and uncompleted portions) is $55,449,000. The total first cost of the uncompleted portion is estimated at $37,288,000. The Federal share of the first costs of the uncompleted portion of the recommended plan is estimated at $14,317,500 and the non-Federal

share is estimated at $22,970,500, including the additional 10 percent ($1,652,000) non-Federal share of the general navigation features required by Public Law 99-662. The Federal and non-Federal share of project costs reflects a $7,300,500 credit to the Port of Long Beach for work already completed by the port on the recommended project. Average annual charges, reflecting a 50-year period of economic analysis and a 7-5/8 percent discount rate, are $3,126,000. Average annual benefits are estimated at $35,495,000, yielding a benefit-to-cost ratio of 11.4 to 1.

4. Washington level review indicates that the proposed plan is technically sound, economically justified, and environmentally acceptable. The proposed project complies with applicable Corps planning procedures and regulations. Also, the views of interested parties, including Federal, State, and local agencies have been considered.

5. Accordingly, I recommend implementation of the proposed project generally in accordance with the reporting officers recommended plan, with such modifications as in the discretion of the Chief of Engineers may be advisable, and subject to applicable cost-sharing and financing requirements. My recommendation is made with the provision that, prior to implementation of the recommended improvements, the non-Federal sponsor shall enter into binding agreements with the Federal Government to comply with the following requirements. For the separable and joint navigation improvements allocated to the Port of Long Beach, the non-Federal sponsor shall:

a. Construct all local service facilities, and for so long as the project remains authorized, operate and maintain the local service facilities and any dredged or excavated material disposal areas in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government.

b. Provide all lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, and maintenance of the general navigation features and the local service facilities. One-half of the cost of deep-draft utility relocations or alterations shall be borne by the local sponsor, and one-half shall be borne by the utility owner.

c. Provide all improvements required on lands, easements, and rights-of-way to enable the proper disposal of dredged or excavated material associated with the construction, operation, and maintenance of the general navigation features and the local service facilities. Such improvements may include, but are not necessarily limited to, retaining dikes, wasteweirs, bulkheads, embankments, monitoring features, stilling basins, and dewatering pumps and pipes.

d. Provide, during the period of construction, a cash contribution equal to 50 percent of the total cost of construction of the general navigation features.

e. Repay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, an additional 0 to 10 percent of the total cost of construction of general navigation features depending upon the amount of credit given for the value of lands, easements, rights-of-way, relocations, and borrow and dredged or excavated material disposal areas provided by the non-Federal sponsors for the general navigation features. If the amount of credit exceeds 10 percent of the total cost of construction of the general navigation features, the non-Federal sponsors shall not be required to make any contribution under this paragraph, nor shall they be entitled to any refund for the value of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas, in excess of 10 percent of the total cost of construction of the general navigation features.

f. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsors, now or hereafter, own or control for access to the general navigation features for the purpose of inspection and, if necessary, for the purpose of operating and maintaining the general navigation features.

g. Hold and save the United States free from all damages arising from the construction, operation, and maintenance of the general navigation features, any betterments, and the local service facilities, except for damages due to the fault or negligence of the United States or its contractors.

h. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of three years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as will properly reflect total cost of construction of the general navigation features, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 CFR Section 33.20.

i. Perform, or cause to be performed, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, and maintenance of the general navigation features. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigation unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigation in accordance with such written direction.

j. Assume complete financial responsibility, as between the Federal Government and the non-Federal sponsors, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, or maintenance of the general navigation features.

k. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA.

l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance, of the general navigation features, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

m. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

n. As part of the payments required by Section 101(a)(1) and Section 101 (a)(2) of Public Law 99-662, as amended, contribute 50 percent to the payment of total historic preservation mitigation and data recovery costs attributable to commercial navigation that are in excess of one percent of the total amount authorized to be appropriated for commercial navigation.

6. Further, in accordance with the provisions of Section 4(d) of the Water Resources Development Act of 1988, I concur with the reporting officers recommendation that the non-Federal sponsor receive credit for work which is compatible with the plan recommended for implementation, an amount currently estimated at $7,300,500. The final credit for the work performed by the Port of Long Beach will be based on the lesser of either the Federal share of the cost of the NED Plan at the time of construction (1990) by the Port of Long Beach or on the Federal share of the actual cost incurred by the Port of Long Beach at the time the work was completed, subject to Government audit, towards the cash contribution required during construction by the Port of Long Beach.

7. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program nor the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to Congress as a proposal for implementation funding. However, prior to transmittal to Congress, the sponsor, the Port of Long Beach; the State of California; interested Federal agencies; and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

PAT M. STEVENS IV
Major General, USA
Acting Chief of Engineers

PORT OF LONG BEACH (DEEPENING) FEASIBILITY STUDY
LONG BEACH, CALIFORNIA

SYLLABUS

Authority and Purpose

This report was prepared in response to Section 201 of the Water Resources Development Act of 1986 (Public Law 99-662), Section 4 of the Water Resources Development Act of 1988 (Public Law 100-676), and Section 102 of the Water Resources Development Act of 1990 (Public Law 101-640). The purpose of the study is to determine the Federal interest in modifying the existing Federal navigation project at Long Beach Harbor to meet existing and projected navigation needs of the Port of Long Beach.

The study recognized that the Port of Long Beach has completed the deepening of the main channel and turning basin to Berth 121 to a minimum depth of -76 feet, Mean Lower Low Water as part of their Pier J expansion project, completed in 1992. The Port has indicated their desire to receive credit, if applicable, for their partial dredging of the Federal navigation project that may result from this study in accordance with Section 4 of the Water Resources Development Act of 1988.

Problems and Needs

The need for navigation improvements at Long Beach Harbor focused on improving the efficiency of transporting crude petroleum to refineries in the San Pedro Bay region. Presently, about 80 percent (16 million metric tons) of crude petroleum received in the San Pedro Bay Port complex, which includes the Port of Long Beach and the Port of Los Angeles, is delivered to Berth 121 in the Port of Long Beach. At this time, over 70 percent of the crude petroleum is received from Alaska sources, with portions of the shipments being delivered in tankers ranging up to 262,000 Dead Weight Tons. These tankers have a design draft of about 68 feet, and would need a channel depth of about 72 feet to come in fully loaded assuming they use three feet of tide, which is the current practice. The existing depth of -60 feet, Mean Lower Low Water in the approach and entrance channel places a constraint on the depth these tankers can load, resulting in inefficient operations and a higher transportation cost per ton of delivered crude petroleum.

Projections of future crude requirements are essentially stable for the San Pedro region. However, as sources in Alaska become depleted, it is expected that the differences will be made up from Far East and Persian Gulf sources. The longer haul distances from these sources generally will create a higher demand for using ultra large tankers to obtain economy of scale savings in transportation costs. However, the existing depths at Long Beach Harbor will constrain the depth of loading and the use of the more efficient larger vessels resulting in higher transportation costs per ton of delivered crude petroleum.

Alternatives Considered

All viable alternative plans were considered to improve the efficiency of operations and reduce the costs for transporting crude petroleum to the San Pedro region. The only identified viable alternative involved deepening the existing navigation channels to allow existing tankers and future larger tankers to access berth 121 more fully loaded.

The formulation of final alternative plans carefully considered the optimization of channel requirements to maximize net average annual benefits and contributions to the Nation's Economic Development (NED). This included examining different design vessels and related channel dimensions required for safe transit, and associated dredging requirements, costs and benefits. It also considered the characteristics and quality of the material required for disposal and alternative methods of disposal. Disposal of the material involved close evaluation of beneficial uses of the material, including potential for beach nourishment, landfill, and ecological restoration or enhancement.

The final alternatives were evaluated based on comparisons to a No Action Plan and considered contributions to National Economic Development and environmental impacts to determine conformity to environmental laws, policies and other guidelines. The plan selected is the National Economic Development Plan (NED Plan).

Environmental Considerations

The report includes a combined Environmental Impact Statement/Environmental Impact Report that presents the assessment and evaluation of impacts to environmental resources and other attributes in accordance with Federal and State laws, policies and other guidelines. The selected plan will provide some positive contributions to the environment through the use of the material for the Pier 400 landfill, which would reduce the need to obtain an equivalent amount of material from other sources. It also will provide some ecological benefits by filling in the deep pit areas to the likely more biologically productive surrounding shallower benthic areas. The project will result in short term adverse impacts related to turbidity and air quality during construction. However, with respect to air quality, there will be long term positive benefits with the reduction of the number of vessel trips required to deliver the required crude petroleum volumes, and therefore the project is considered to be in conformance with the State's Implementation Plan for Air Quality. In general, the selected plan has been found to be in conformance with Federal, State and local statutes and policies.

Agency and Public Coordination

Public workshops, scoping meetings, and coordination with Federal, State, and local agencies have been accomplished to aid in the formulation and evaluation of the proposed Recommended Plan.

Public and agency views including informal comments received to date from representatives from EPA, US Fish and Wildlife Service, National Marine Fisheries, California State Fish and Game, and the City of Long Beach have indicated no opposition or major concerns with the proposed Recommended Plan.

At a meeting held in Eureka, California on September 13, the California Coastal Commission voted to unanimously approve the Coastal Consistency Determination for the Recommended Plan.

The Recommended Plan

The Recommended Plan is divided into two parts; the completed portion and the uncompleted portion.

The uncompleted portion is described as follows;

Based on the study results, the District Engineer proposes to recommend that the existing Federal deep draft navigation project at Long Beach Harbor be modified to include deepening the approach and entrance channel to a depth of -76 feet Mean Low Low Water to allow safe transit of a design vessel of 365,000 DWT. Disposal of material would include 2 million cubic yards to the Port of Los Angeles for placement as part of their Pier 400 landfill, that is presently under construction; 2.1 million cubic yards to be placed in the deepened borrow pit area of the Main Channel of the Long Beach Harbor; and 1.5 million cubic yards to be placed in the smaller deepened borrow pit area located near the Southeast Energy Island.

The completed portion is described as follows;

The Recommended Plan also includes incorporating the channel deepening of the Main Channel and turning basin completed by the Port of Long Beach as part of the Pier J Expansion Project that is consistent with the NED optimization, and that this channel be included in the Recommended Plan as a Federal maintenance responsibility, with appropriate cost-sharing by the Port of Long Beach.

The District Engineer also proposes that the Port of Long Beach receive credit for the Federal share of the work they completed towards construction of the Recommended Plan, based on the lesser of the Port of Long Beach's actual cost or the Corps of Engineers's estimated cost of the work assuming it was completed by the Federal Government consistent with the Recommended Plan.

Figures 1 and 2 present the Recommended Plan channel improvements and dredged material placement locations, respectively. Table 1 presents economic and cost-sharing information on the Recommended Plan.

In accordance with the provisions of Section 101 of the Water Resources Development Act, the Federal share of the uncompleted portion of the Recommended Plan would be $7,017,000 (includes aids to navigation), and the non-Federal share would be $30,271,000.

By applying applicable crediting guidance, the Port of Long Beach shall be given credit towards their costs for construction of the completed portion of the Recommended Plan. This credit is estimated to be $7,300,500, which results in the Federal share becoming $14,317,500, and the non-Federal share being $22,970,500.

The District Engineer's proposed recommendation is made with the provision that prior to implementation, the Port of Long Beach will be in accordance with the general requirements of law for this type of project, agree to provide certain items of local cooperation outlined in his Recommendations, and with such further modifications thereto as in the discretion of the Chief of Engineer's may be advisable.

FIGURE 1. RECOMMENDED PLAN CHANNEL IMPROVEMENTS

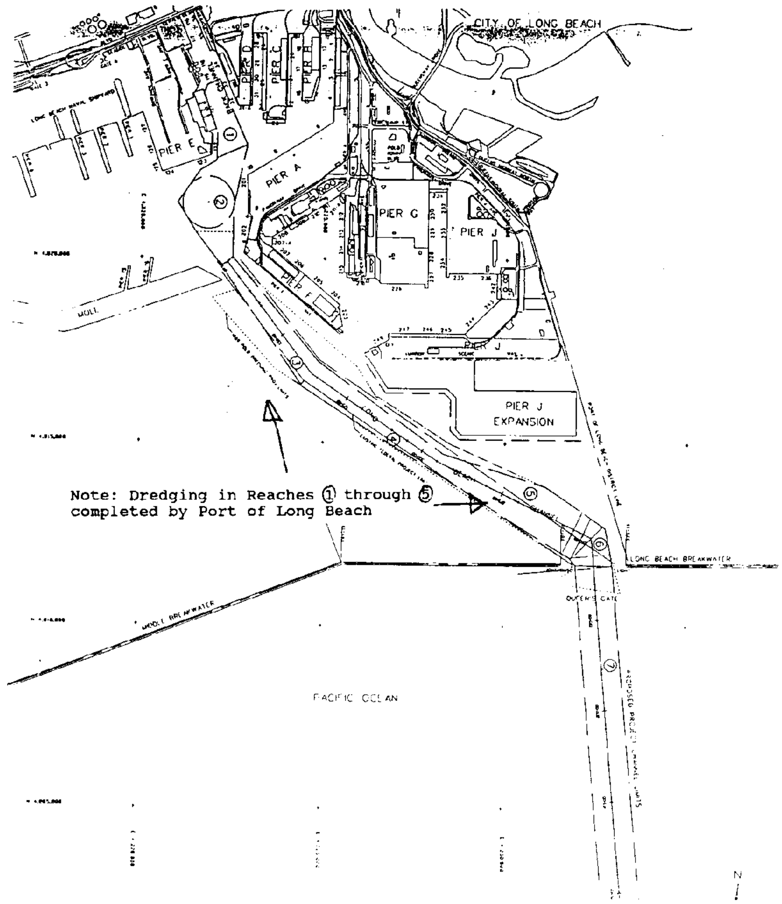


FIGURE 2. RECOMMENDED PLAN DREDGED MATERIAL PLACEMENT AREAS.

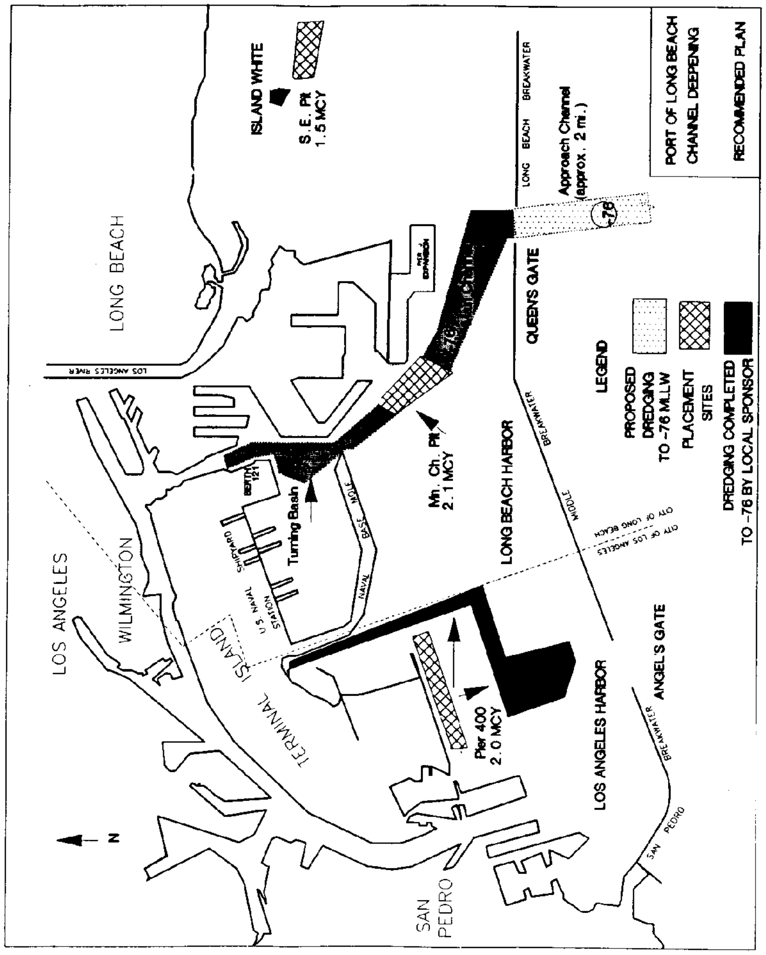


TABLE 1. ECONOMIC INFORMATION ON THE RECOMMENDED PLAN
(OCTOBER 1995 PRICE LEVELS)

	Recommended Plan (Remaining Portion)	
Project First Costs		
Total First Cost	**$37,288,000**	
Federal Cost	**$14,317,500**	**(1)**
Non-Federal Cost	**$22,970,500**	**(2)**
Int. During Construction	**$2,715,000**	
Total Investment	**$40,004,000**	
Average Annual Cost		
Interest and Amortization	**$3,176,000**	
Operation and Maintenance	**$0**	
Total Average Annual Cost	**$3,176,000**	
Average Annual Benefits	**$34,685,000**	
Average Annual Net Benefits	**$31,509,000**	
Benefit-Cost Ratio	**10.9:1**	

(1) = Includes credit due local sponsor for completed portion ($7,300,500) plus Fed. Share of uncompleted portion ($7,017,000).

(2) = Includes associated cost of $20,000,000 to be financed primarily by users of Berth 121. Does not include amount spent on completed portion that is being reimbursed.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

STUDY AUTHORITY

Federal authorization and involvement in providing navigation features and improvements for Long Beach Harbor dates from 1856. Congress has authorized Federal study of improvements in a number of actions in response to requests. The primary concern has been to ensure that harbor facilities are adequate to efficiently meet present and future cargo handling and distribution needs. A summary of recent pertinent Congressional Authorizations include:

1. **The Water Resources Development Act of 1986 (P.L. 99-662, Title II, Harbor development, Section 201 (b) and Section 905), which read:**

Section 201 (b)

"AUTHORIZATION OF CONSTRUCTION SUBJECT TO FAVORABLE REPORT - The following projects are authorized to be prosecuted by the Secretary substantially in accordance with the plans and subject to the conditions recommended in the respective reports cited, with such modifications as are recommended by the Chief of Engineers and approved by the Secretary, and with such other modifications as are recommended by the Secretary. If no report is cited for a project, the project is authorized to be prosecuted by the Secretary in accordance with a final report of the Chief of Engineers, and with such modifications as are recommended by the Secretary, and no construction on such project may be initiated until such a report is issued and approved by the Secretary.

LOS ANGELES AND LONG BEACH HARBORS, SAN PEDRO BAY, CALIFORNIA - The project for deepening of the entry channel to the harbor of Los Angeles, California to a depth of 70 feet and for deepening of the entry channel to the harbor of Long Beach, California, to a depth of 76 feet, including creation of 800 acres of land with the dredged material from the project, as Phase I of the San Pedro Bay development, at a total cost of $620,000,000, with an estimated first Federal cost of $310,000,000 and an estimated first non-Federal cost of $310,000,000."

2. **Water Resources Development Act of 1988 (P.L. 100-676, Section 4, Project Modifications), which reads:**

"The navigation project for Los Angeles and Long Beach Harbors, San Pedro Bay, California, authorized in section

201 of the Water Resources Development Act of 1988 (100 Stat. 4091), is modified to provide that, if non-Federal interests carry out any work associated with such project which is later recommended by the Chief of Engineers and approved by the Secretary, the Secretary may credit such non-Federal interests an amount equal to the Federal share of the cost of such work, without interest. In analyzing costs and benefits of such project, the Secretary shall consider the costs and benefits produced by any work which is carried out under the preceding sentence by non-Federal interests and which the Secretary determines is compatible with such project. The feasibility report for such project shall include consideration and evaluation of the following proposed project features: Long Beach Main Channel, Channel to Los Angeles Pier 300, Channels to Los Angeles Pier 400, Long Beach Pier "K" Channel, and Los Angeles Crude Oil Transshipment Terminal Channel."

3. **Water Resources Development Act of 1990 (P.L. 101-640, Section 102, Project Modifications), which reads:**

Los Angeles and Long Beach Harbors, San Pedro Bay, California - Section 4 (d) of the Water Resources Development Act of 1988 is amended by inserting after "approved by the secretary" in the first sentence the following: "or which is carried out after approval of the final report by the Secretary and which is determined by the Secretary to be compatible with the project.

STUDY PURPOSE AND SCOPE

In cooperation with the Port of Long Beach, the Corps of Engineers has sought to determine in this Feasibility Study (1) the existing and future needs for improvements to navigation for crude petroleum vessels calling in the Port of Long Beach (POLB) and (2) the extent of needed navigation improvements which are economically justified and consistent with applicable environmental laws and policies.

The study was conducted in accordance with Federal laws, policies, and procedures as contained in Engineering Regulation 1105-2-100, "Guidance for Conducting Civil Works Planning Studies", dated 28 December, 1990. The scope of the study is consistent with the requirements of Section 905 of the Water Resources Development Act of 1986 which states:

"Such feasibility report shall describe with reasonable certainty, the economic, environmental, and social benefits and detriments of the recommended plan and alternative plans considered by the Secretary and the engineering features (including hydrologic and geologic information), the public acceptability, and the purposes, scope, and scale of the recommended plan. The feasibility report shall also include the views of other Federal agencies and non-Federal agencies with regard to the recommended plan when such plan does not have significant non-structural features, and a description of the Federal and non-Federal participation in such plan, and shall demonstrate that States, other non-Federal interests, and Federal agencies have been consulted in the development of the recommended plan."

STUDY PURPOSE

The purpose of the Feasibility Study is to determine Federal interest in navigation improvements to the Main Channel and Approach Channel in the Port of Long Beach. The need for these improvements is driven by the crude petroleum fleet supplying local refineries through Berth 121, Pier E, in the Port of Long Beach. Presently, vessels are forced to light-load due to draft constraints in the main channel and approach channel. In addition, projections indicate the fleet make-up will shift towards even larger vessels in the future. Significant transportation savings could be realized by improving the efficiency of this operation. This study examines the viable alternatives to address this problem, including providing a deeper channel to Berth 121.

BACKGROUND

The Ports of Long Beach and Los Angeles originally entered a joint Feasibility Study with the Corps in 1987. Six separate increments of navigation improvements were identified and shown to be economically justified and environmentally acceptable. One of these increments (Increment One) involved deepening the Long Beach Main Channel. Citing cost, schedule, and mitigation problems, the Port of Long Beach withdrew from the Feasibility process by letter dated 1 October 1991. The Feasibility Study was approved in December 1993, but Increments 1 and 6, (see attached Figure 1), in the Port of Long Beach, were not included in the Recommended Plan due to the local sponsor's withdrawal of support.

By letter dated 30 March 1994, the Port of Long Beach requested that the Corps resume the Feasibility study on an expedited schedule. In addition, they indicated that they would like to apply for credit under Water Resources Development Act 1988 for work they had already completed which deepened the Main Channel inside the breakwater and placed the material behind dikes for expansion of Pier J in the Port of Long Beach.

STUDY PARTICIPANTS AND COORDINATION

Coordination

This study has been a cooperative effort involving the Port of Long Beach and the Los Angeles District, Corps of Engineers. In addition to on-going coordination throughout the study process to ensure consistent goals, objectives, and evaluation standards, the Corps and the Port have actively coordinated with the following local, state, and Federal agencies.

Agency
1. City of Long Beach
2. California Coastal Commission
3. South Coast Air Quality Management District
4. USF&WS
5. California Department of Fish and Game
6. California Public Utilities Commission
7. National Marine Fisheries Service
8. U. S. Environmental Protection Agency
9. California Department of Boating and Waterways
10. Waterborne Commerce Statistics Center
11. Energy Information Administration
12. Maritime Administration

Public Involvement

The need for navigation improvements for the Port of Long Beach has been addressed at a number of public meetings and other public involvement activities. This includes meetings conducted as part of the earlier study on the Ports of Los Angeles and Long Beach, which presented alternatives for dredging the Long Beach Main Channel, also known as Increment One. Two scoping meetings were held October 8, 1987 at the Port of Long Beach and the Port of Los Angeles on the earlier study. The draft report and proposed recommendations for improvements at the Ports of Los Angeles and Long Beach were also presented at a Public Meeting conducted on October 9, 1990. Comments and views expressed during these three public meetings were incorporated into the 1992 Feasibilility Report and this Feasibility Report. In addition, an agency coordination meeting was held on 20 October 1994 and one public scoping meeting was held on November 1 1994, specifically addressing navigation improvements for the Port of Long Beach. The comments received have been addressed in this report and EIS/EIR.

PREVIOUS STUDIES

Previous studies related to harbor needs and improvement opportunities have been conducted by both the Ports and the Corps, as well as independent studies by local and state agencies. These studies have been used extensively in development of this feasibility report. Studies used as a basis for this report are listed on Table 1, below:

Table I-1 PREVIOUS STUDIES
(by subject)

Date	Subject	Author
Geotechnical Investigations		
1973	Detailed Environmental analysis Concerning Proposed LGN Facilities and Associated Gas Transmission Pipelines for Western LGN Terminal Company.	Dames and Moore, Inc.
1974	Sediment Compositions in the Los Angeles-Long Beach Harbors and San Pedro Bay.	K.Y. Chen and J.C.S. Lu
1975	Offshore Soils Investigation Los Angeles Harbor - LNG Ship Terminal.	Dames and Moore, Inc.
1976	Geotechnical Investigation, Los Angeles Outer Harbor, Port of Los Angeles.	Woodward-Clyde, Consultants
1976	The Port of Long Beach, Long Beach, California Environmental and Geotechnical Sampling Program.	Bryant and Associates
1976 -78	Harbor Deepening Project Geophysical Survey.	Corps of Engineers
1978	Marine Geophysical and Cultural Surveys -- Proposed Pipeline Route Offshore Long Beach, CA	Dames and Moore, Inc.
1978	Geotechnical Investigation Proposed Sohio Terminal, Long Beach, CA.	FUGRO, Inc.
1984	Side-Scan Sonar Survey Los Angeles/Long Beach Breakwater System.	Leighton and Associates
1986	Geotechnical Investigation, Pier J Expansion Project.	Port of Long Beach; Geofon, Inc.
1986	Pier J Expansion Fill Material and Special Considerations.	Port of Long Beach; C.T. Johnson
1986	Geotechnical Design Report Dredging and Landfill Island Construction, Pactex Marine Oil Terminal, Port of Los Angeles, CA.	Harding Lawson Assoc.
1987	Pier J Landfill and Anaheim Bay Mitigation Projects	Port of Long Beach
1987	Geotechnical Report, Los Angeles/Long Beach Harbor Feasibility Study.	Corps of Engineers
1991	2020 Plan Geotechnical Report	FUGRO/McClelland Engineers
1994	Queen's Gate Dredging Geotechnical Report	Port of Long Beach; Sea Surveyors, Inc.
Project Need		
1979	Reconnaissance Report: Transportation Study.	Corps of Engineers
1979	Port of Los Angeles Port Master Plan.	Port of Los Angeles
1981	Risk Management Plan, an Amendment to the Certified Port Master Plan.	Port of Long Beach
1983	Risk Management Plan	Port of Los Angeles
1983	Port Master Plan Update	Port of Long Beach

Table I-1 PREVIOUS STUDIES
(by subject)

Date	Subject	Author
1984	Survey Report: San Pedro Bay Transportation Study.	Corps of Engineers
1984	Draft Feasibility Report for Channel Improvements: Los Angeles -- Long Beach Harbors.	Corps of Engineers
1985	2020 Master Plan.	Ports of Los Angeles and Long Beach
1987	Bulk Loads Relocation Plan and Implementation Program OFI Study.	Port of Los Angeles
1987	Hazardous Facilities Relocation Plan.	Port of Los Angeles
1987	Final Report: San Pedro Bay Cargo Forecasting Project 2020.	Ports of Los Angeles and Long Beach
1988	Commodity Forecasts for LA-LB Harbors (2020 Master Plan and 2040 Update).	Wharton Econometrics Forecasting Assoc.
1988	Cargo Handling Operations, Facilities, and Infrastructure Report	Vickerman, Zacharay, and Miller
1988	Forecast of Vessel Fleet Composition	Temple, Barker, and Sloan
1988	Terminal Island Transport Badger Avenue Bridge Study	DeLeuw, Cather, and Co.
1988	Los Angeles and Long Beach Ports Vessel Calls Study.	Corps of Engineers
Environmental Resources*		
1976	Draft EIR, Master Environmental Setting.	Port of Long Beach
1984	Draft Environmental Impact Statement for Channel Improvements.	Corps of Engineers
1985	Final Programmatic EIR/EIS for Landfill Development and Channel Improvement.	Corps of Engineers; Ports of Long Beach and Los Angeles
1985	EIR/EIS for Proposed Pacific Texas Pipeline Project	Los Angeles Harbor Department and Bureau of Land Management
1987	Draft EIS, Final Designation of a Dredged Material Disposal Site off Los Angeles, CA	U.S. EPA
1987 -88	Pier J Landfill and Anaheim Bay Mitigation, Final Subsequent EIR and Port Master Plan Amendment.	Port of Long Beach
1992	Los Angeles/Long Beach Harbors Feasibility Study Final EIS	Corps of Engineers

*** Major EIR/EIS only. Detailed bibliography for environmental studies associated with LA/LB Harbor Development is found in the Draft EIR/EIS which accompanies this Main report.**

II STUDY AREA DESCRIPTION

HARBOR DESCRIPTION

Harbor Importance

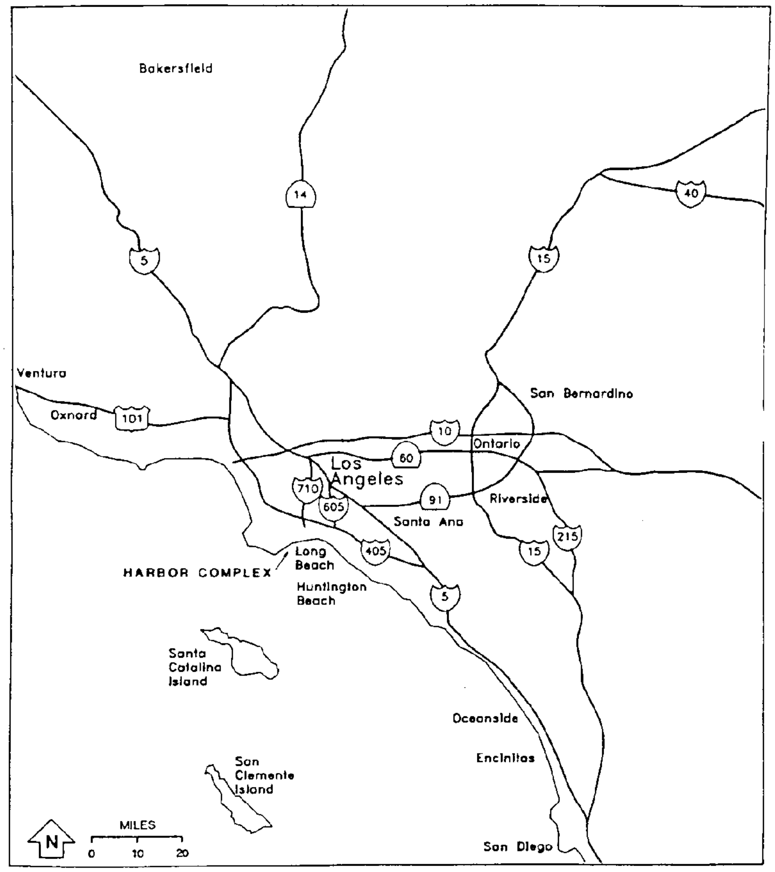
The Los Angeles-Long Beach harbor complex (hereafter the Ports) is the largest west coast port complexand the fastest growing port complex in the United States, handling the highest volume of containerized cargo in the nation. Studies performed by Wharton Econometric Forecasting Associates (WEFA) indicate that foreign trade passing through the Ports in 1987 was valued at $70,000,000,000. Total trade is expected to increase from about 100,000,000 metric tons in 1990 (this figure is from the Waterborne Commerce Statistics Center and actually exceeds the 1987 WEFA forecast by about 10%) to almost 200,000,000 metric tons by the year 2020. The Ports are thus a major trade link between the entire United States via rail and highway connections and its trading partners on the Pacific Rim. Given their proximity to a major industrial center, a major petroleum refining center, as well as to the largest population center in the nation, the harbors have national economic importance, making a significant contribution to regional and national economic development.

The Ports of Long Beach and Los Angeles have a local service area (within a 150-mile radius of the harbors) of substantially more than 16 million people. Population projections for the next 50 years suggest growth to over 25 million people within this area. The Ports of Long Beach and Los Angeles are the primary focal point of import-export activity for the southwestern United States. In 1985, the Ports handled approximately 55% of all cargo passing through U.S. west coast ports. The Ports are also a major import-export link between Pacific Rim countries and the central and eastern United States. Approximately 40-45 percent of the total volume of cargo which passes through the Ports is intermodal or "landbridge" traffic, traffic outside of the local service area (the western United States is considered the regional service area for the Ports.

Harbor Location

The Ports (Figure II-1) are located within San Pedro Bay, Los Angeles County, California approximately 25 miles south of downtown Los Angeles, 370 nautical miles southeast of San Francisco Bay, and 95 nautical miles northwest of San Diego Bay. The Ports lie between the Palos Verdes Peninsula and the mouth of the Los Angeles River and are protected by three breakwaters.

Figure II-1 - Location of LA/LB Harbors, San Bedro Bay, California



NAVIGATION FEATURES

General

The San Pedro Bay area which includes the Ports of Long Beach and Los Angeles is sheltered by three breakwaters. The Port of Long Beach is located in the Eastern half of San Pedro Bay, between the Port of Los Angeles and the downtown Long Beach/Shoreline Marina area. Federally maintained anchorage areas within the breakwater are currently used for bunkering, awaiting berth, and supply loading.

1. The San Pedro Breakwater, a stone breakwater, 11,150 feet long extending from Point Fermin;
2. The Middle Breakwater, a rubblemound detached breakwater 18,500 feet long; and
3. The Long Beach Breakwater, a rubblemound detached breakwater 13,350 feet long.

Between the San Pedro Breakwater and the Middle Breakwater is a 1000-foot wide entrance channel with a present depth of -51 feet, MLLW to Los Angeles Harbor (Angel's Gate). Between the Middle Breakwater and the Long Beach Breakwater is a 1200-foot wide entrance channel with a present depth of -60 feet, MLLW to Long Beach Harbor (Queen's Gate) (Figure II-2). The Ports are thus unified geographically, and they serve the same market areas.

Federal Navigation Features

Table II-1 shows channel authorized depth, baseline condition depth, and existing depths. As this table shows, the existing channel is deeper than the authorized Federal project, due in part to subsidence and in part to local dredging projects. The authorized depth is -35 MLLW, but the Port dredged the channel to -60' MLLW between 1970 and 1973, and dredged the berthing area at Berth 121 and the turning basin just south of there to -76' MLLW shortly thereafter. In 1990-1991, the Main Channel inside the breakwater was deepened to -76' MLLW, and this is the existing condition.
The completed features of the Federal Project are shown on Figure II-3. The Federal project consists of breakwaters, channels, turning basins, and anchorages. Each of these is identified on Figure II-3.

Figure II-2 - Long Beach Harbor Entrance and Breakwaters and Land Use

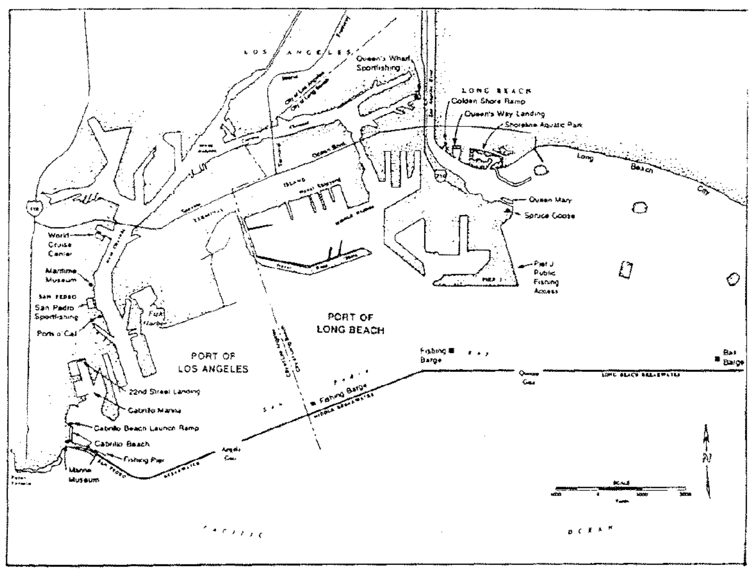
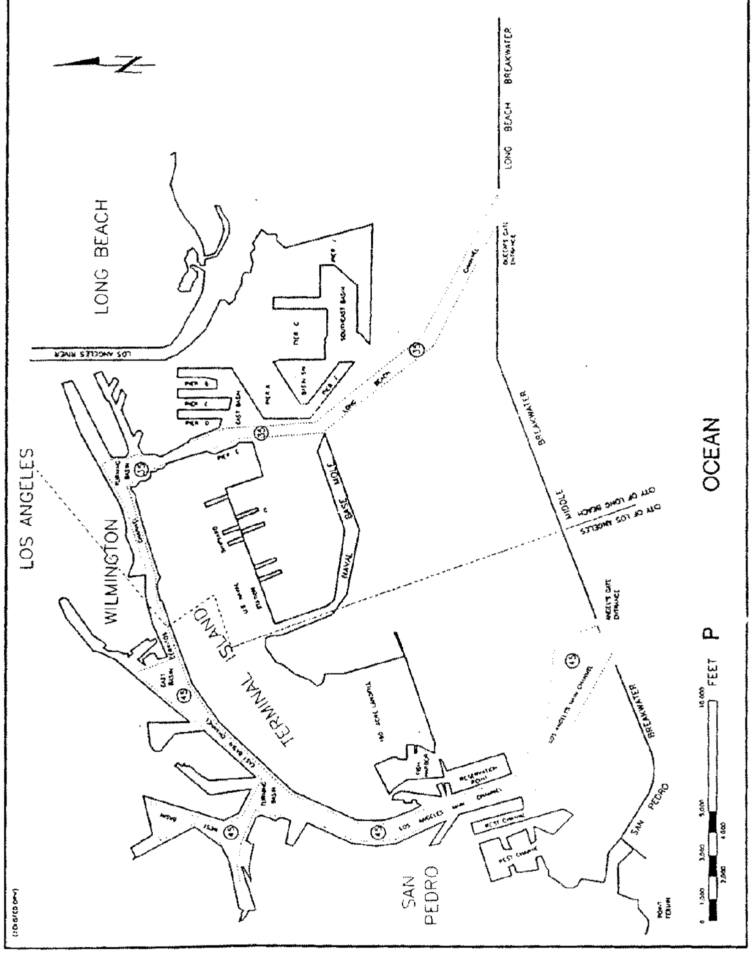


Figure II-3 Federal Project Features



Non-Federal Navigation Features

The Port of Long Beach maintains inner harbor channels, berthing areas and dikes which protect terminal areas from erosion by wave and tidal action. In addition, the port maintains 7 anchorage areas: 4 deep draft anchorages providing 60 berths in water maintained at from 24 to approximately 40 feet and 3 shallow draft anchorages. Thirty-one of the berths are outside of the harbor breakwaters.

TABLE II-1 CHANNEL DEPTHS AND WIDTHS, LONG BEACH CHANNEL

Channel Section (Reach)	Berth Channel Depth*		
	Authorized (ft, MLLW)	Pre-Pier J Depth	Actual Controlling Depth. (ft, MLLW)
At and Outside of Gate	35	60+	60+
Main Channel	35	60	76
Turning Basin	35	76	76
Berth 121	35	76	76

***Depths greater than authorized project depths are a result of subsidence and/or local dredging.**

PHYSICAL CONDITIONS

Climate

The climate of San Pedro Bay is characterized by warm, dry summers and mild winters. Average annual high and low temperatures are 74 degrees F and 53 degrees F. Nearly 90 percent of the annual precipitation falls within the months of November to April. The mean annual precipitation in the harbor area is about 12 inches. The prevailing winds in San Pedro Bay are from the southwest or west. The winds are usually light, with velocities sometimes reaching 15 to 20 knots during the summer afternoons. Occasionally during the fall and winter months, strong hot winds from the Great Basin area create an offshore wind condition (Santa Ana Winds). Winds can sometimes reach hurricane velocities; these occur during strong winter storms or rare tropical cyclones which normally track across central Mexico.

Topography

The harbors are in the lee of the Palos Verdes Peninsula, but themselves sit on virtually flat filled marshlands of the Los Angeles River delta. Land surface elevations within harbor boundaries are from -29 (subsidence on Terminal Island) to + 25 feet, MLLW.

Geology

The harbors are located on the Pacific Plate in an area of high and relatively frequent seismic activity generated by that plate's movement in a northerly direction and by subduction of the plate beneath the North American Plate. Being at the margin of these two major tectonic plates, the entire southern California area is crossed by active faults, the most important of which are the San Andreas Fault, the San Jacinto Fault, the Elsinore-Whittier Fault, and the Newport-Inglewood Fault. These northwest trending faults caused 29 moderate and 3 major earthquakes from 1933 to 1973; from 1769 to 1933, estimates of earthquake magnitude indicate that there were 31 moderate earthquakes, 7 major earthquakes, and 1 great earthquake.

In the immediate project vicinity, the Newport-Inglewood Fault crosses the Los Angeles River just inland from the harbor boundaries; this fault is capable of a Richter magnitude 7+ earthquake. The 1933 Long Beach earthquake, which caused extensive damage, was on this fault and had an estimated magnitude of 6.3.

The harbor itself is underlain by metamorphic rock formations topped by sedimentary rock of more recent origin. There are three layers of sedimentary deposit over the basement rock. At the surface, there is a layer of Quarternary Period silts, cobbles, sands and clay up to several hundred feet thick. Below this are sedimentary rock formations and clays and sands approximately 1000 feet thick. These lie atop a 1000-1500 foot thick layer of older sedimentary and volcanic rocks.

Surface sediments in the dredge area range from sandy silt to silty sand and contain from 10 to 100% fines. Only very slight levels of contaminants were detected in a small area near Queen's Gate. Sediments in the inner harbor range from silty sand to mud and contain from 7 to 100% fines. Slightly higher levels of contaminants are found in depressions in the harbor floor where floculents collect.

Bathymmetry

The dominant influence on harbor bathymetry has been dredge and fill operations which have left deep channels and basins in the otherwise gradually sloping sediments which underlie the harbor. Outside of these engineered alterations to the bathymetry, the harbors have a gentle slope; at the base of Pier J the depth is 40 feet while depth at the breakwater several miles away is approximately 60 feet. Figure II-4 shows the Project area bathymmetry.

Outside the breakwaters, the plateau slopes gently towards the edge of the San Pedro shelf. The plateau does not reach depths of 70-75 feet until about 2 miles from Queen's Gate.

Inside the breakwaters, the Ports can be divided into two distinct areas; inner and outer harbor. The inner harbor area consists of navigation channels through sedimentary soils between Terminal Island and the mainland. Subsidence has occurred in inner Long Beach Harbor as a result of extraction of petroleum within the harbor. Subsidence began with pumping in the oil fields in 1928 and was halted by water injection in 1958. Total maximum subsidence measured between 1928 and 1965 is 29 feet. Vertical displacement is centered near the eastern end of Terminal Island.

The outer harbor area is a gently sloping plateau with depths ranging from 10 to 70 feet, primarily an open-water area.
In the anchorage areas adjacent to the Long Beach channel between the Navy Mole and Queens Gate, depths vary from 36 feet to 64 feet. Outside of the harbor, depths range from 60 feet at Queens Gate to 78 feet at approximately 11,000 feet south of Queens Gate.

There are several man-made depressions (up to 35 feet below surrounding bottom elevations) in the outer harbor which are the result of previous dredging operations. There are four of these "pits" of significant size in Long Beach Harbor. Two of them are adjacent to Island White, one is near the mouth of the Los Angeles River, and one is in the Long Beach Main Channel. The locations of these pits, their approximate volumes, their maximum depths, and their approximate area in acres is given in Figure II-5.

Figure II-4 Overall Bathymmetry, Project Area

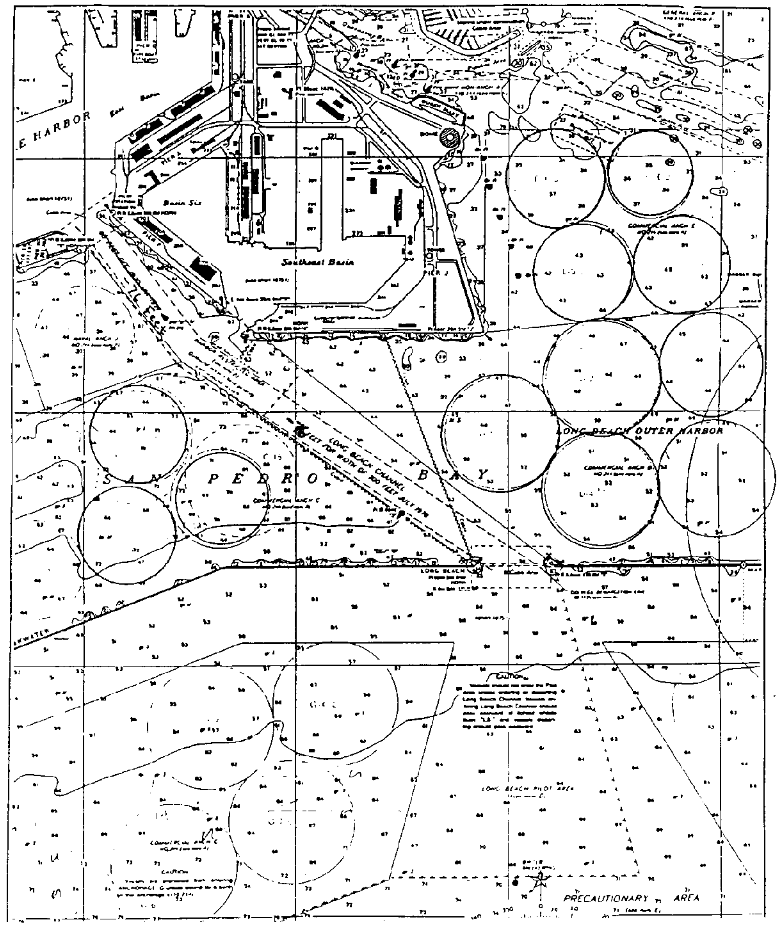
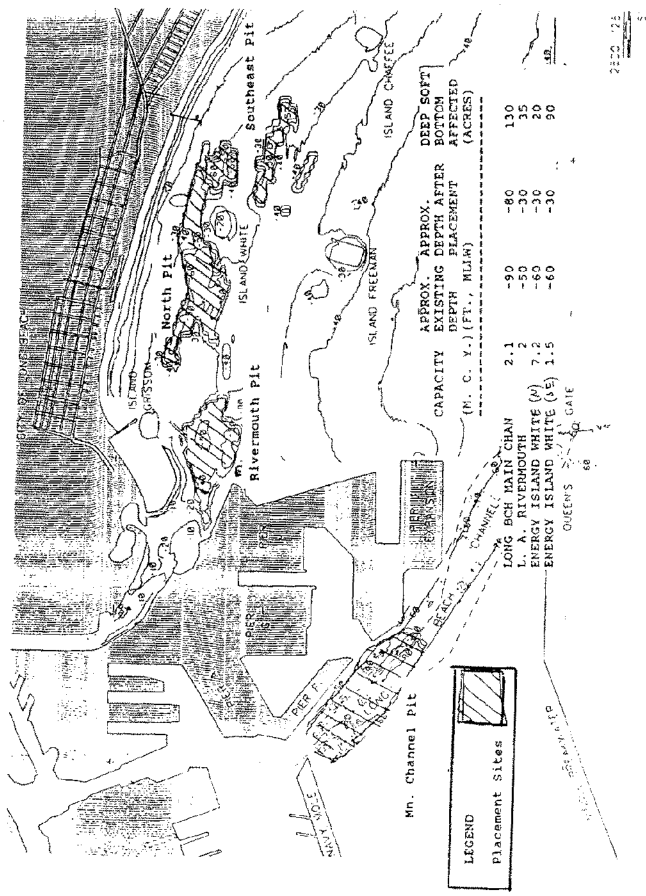


Figure II-5 Pit Locations, Volumes, Bathymmetry, and Areas



Wave Climate

Due to the sheltering effect of Palos Verdes Peninsula, Santa Catalina Island and San Clemente Island, deepwater waves approach San Pedro Bay from the west and from southern hemisphere storms (Figure II-6). The San Pedro, Middle, and Long Beach breakwaters provide protection to the harbors from approaching waves. Outside of the breakwaters, waves of 10-12 feet are not uncommon. The design wave for the breakwaters is from 17 to 22 feet. The major storms of the winter of 1983 are an indication of the potential severity of wave climate outside the breakwaters. Waves in the 18-20 foot range breached 90 foot sections of the San Pedro Breakwater during these storms.

Small waves with periods of 1 to 3 seconds on 10-to-20 second swells are characteristic within the breakwaters. Seiche or standing waves, having periods ranging from 30 seconds to more than one hour, also occur in the bay.

Tides and Tidal Circulation

Tides along the California coast are semidiurnal with two unequal high tides and two unequal low tides occurring each day. The highest and lowest tides reported in San Pedro Bay are 7.54 ft MLLW and -2.56 ft MLLW, respectively. The maximum tidal range is 10.1 ft and the minimum range is 3.8 feet. Flood and ebb tidal velocities reach up to 1.0 ft/sec (.3 m/sec) in the Angel's Gate during spring tides. Maximum surface tidal velocities occur in the outer harbor near Angel's and Queen's Gates, while minimum tidal velocities occur in the inner harbor.

Tidal circulation is generally clockwise within the harbor with tidal influences causing flows of 0.2 to 0.31 f/s in inner channels and 0.34-1.06 f/s in the entrance channels. Tidal flushing is the primary influence on water quality in the inner harbor areas, where as many as 90 tidal cycles are necessary to completely flush contaminants from the most isolated channels. While water quality appears to have improved since passage of the Clean Water Act of 1974, inner harbor water quality is often marginal. For example, dissolved oxygen levels in some inner harbor areas have been measured at well below minimum standards during some periods.

ECONOMIC CONDITIONS

LAND USE

The Port of Long Beach (Figure II-3) occupies a total land area of 2,808 acres and protected water area of about 4,700 acres. The 4,700 acres of water area consist mostly of the outer harbor area within the breakwaters. This open water area is used as an anchorage for commercial, naval, and private vessels, generally those awaiting access to docking facilities.

Of its 2808 acres of land area, the Port of Long Beach devotes the largest portion (39 percent) to non-Port owned facilities including Federal Government (17 percent), Los Angeles County Flood Control, and private areas (21 percent) including railroads. The largest portion of Port owned land (37 percent) consists of Commercial Shipping, which include general cargo handling facilities, container terminals, open storage, and transfer areas for cargo. The next largest portion is taken by roadway areas (10 percent), oil and gas production facilities (6 percent) such as tank farms and refineries, drilling sites and injection wells. The remaining 9 percent of the land area in the harbor is used for port-related industries and facilities such as container storage, railroads, utilities (including a Southern California Edison Power Station), commercial and recreation areas, non-port related businesses such as an auto salvage yard, and hazardous cargo handling facilities. The undeveloped areas total less than 3 percent.

U.S. Navy Facilities

The U.S. Navy facilities, located at the western portion of the harbor, consist of the Long Beach Naval Shipyard and the Fleet and Industrial Suppl1y Center. The Naval Station has been deactivated, but some facilities still serve the needs of the Naval Shipyard. Slips and moorings for recreational boats are concentrated in the area northeast of Pier J away from the Long Beach Main Channel as shown on Figure II-2.

The Naval Shipyard is used for repair of major vessels in its fleet, and also utilizes many facilities in the decommissioned Naval station for support for the Shipyards activities. All of these facilities are in Long Beach Harbor (West Basin). In addition, the Navy owns and leases lands on Terminal Island in Los Angeles Harbor, adjacent to its Long Beach holdings. Naval personnel are stationed on the base, which thus includes limited housing facilities and recreational areas. The Navy Mole has been used for fuel storage (tank farm), an intermediate maintenance area, ship supplies facility, a brig, a communications center, and a recreation area. The Naval Shipyard is scheduled to be closed in 1997 or 1998.

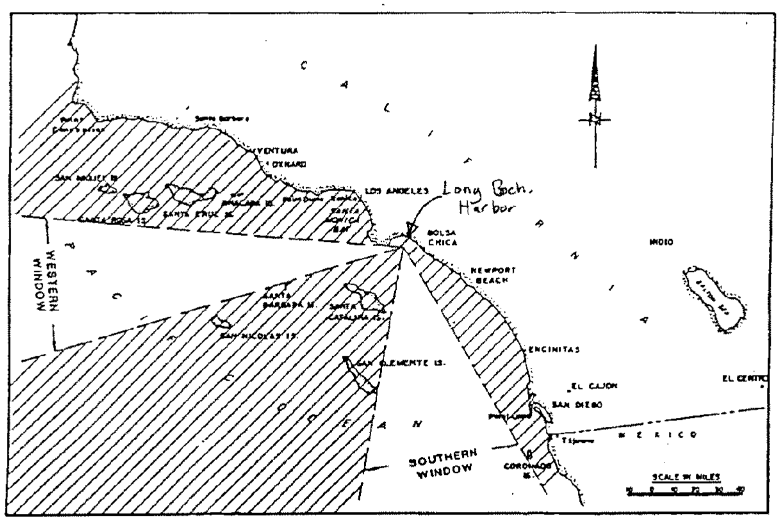
Adjacent Community Development

At their inland boundary, the Ports are surrounded by a number of intense urban developments. There are pockets of residential development mixed with commercial and recreational development in adjacent communities. In San Pedro, residential communities line the hillsides facing the harbors, with residential development generally beginning to the northwest of 8th Street. To the north, the cities of Long Beach and Wilmington contain heavy industrial and commercial development such as oil refineries and heavy industry. However, Wilmington has virtually no near-harbor residential development. To the northwest, the Palos Verdes Peninsula (San Pedro) is a residential and commercial area. There is relatively dense residential development along the beachfront immediately downcoast from the mouth of the Los Angeles River.

ENVIRONMENTAL CONDITIONS

A detailed assessment of environmental conditions in the project area may be found in the Draft EIS, but a brief summary of the major resource categories is given below.

Figure II-6 Wave Sheltering/Windows



Air Quality

Air quality in the vicinity of the Ports is considered good in comparison to inland areas due to the presence of strong daytime breezes, and the lack of upwind emission sources. Air quality is of immediate concern in the planning process because the Air Quality Basin in which the harbor is located is in a non-attainment area. A State Implementation Plan is in effect to comply with the Clean Air Acts as amended. The region and the project is expected to be in compliance with the State Implementation Plan by the year 2010.

Water Quality and Circulation

In general, water quality in the outer harbor is good: the area supports a productive mature biological community. Water quality in the inner harbor has improved in recent years with imposition of regulations prohibiting discharges of untreated waste into these areas, but is generally not as good as the outer harbor. Salinity varies in the harbor as a result of freshwater input from land runoff, waste discharges, rainfall and from evaporation. The usual range for the harbors is 30.0 to 34.2 ppt. The greatest variations are observed in inner harbors with the maximum values in summer and minimums during winter storms.

Biological Resources

As would be anticipated, the most important habitats in the harbor area are found at the outer margins of existing landfills, and along the breakwaters and drilling platforms in open water. Because water quality in the outer harbor areas is generally good, these areas are habitat for a variety of fishes and marine biota comprised primarily of invertebrates. The Ports' fish population is comprised of at least 132 species, many of which are components of the commercial and recreational fishery. The Ports also support an avifaunal population made up of over 150 species, including two endangered species, the California least tern and the California brown pelican. Many of the birds frequent the harbor in the winter months, using the area as a resting or over-wintering site during their annual migrations. Benthic communities generally consist of polychaete worms. There are, in general, no species present that are uncommon or of special concern in the benthic communities.

Archeological and Cultural Resources

A magnetometer and side scan sonar survey of the dredge area was performed and one anomaly was identified that could be a shipwreck dating back to late 1800's. Further field investigation has revealed the anomaly to be insignificant debris.

III PROBLEMS AND NEEDS

GENERAL

The need for navigation improvements at the Port of Long Beach is driven by the large vessels transporting crude oil to Berth 121 (see Figure III-1). Although the Port has deepened the main channel inside the breakwater (from Queen's Gate to Berth 121) to approximately -76' MLLW, The limiting depth at the Gate and outside the breakwater is only -60' MLLW, which constrains the depth of loading and size of vessels transporting crude petroleum to Berth 121.

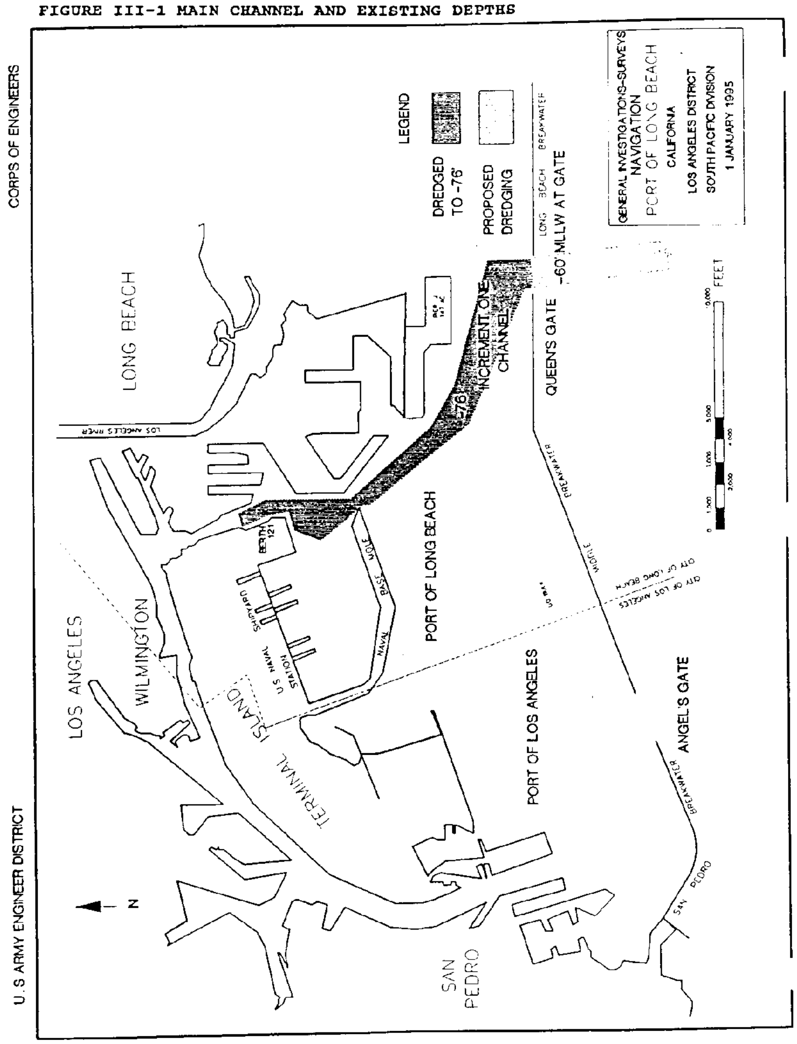
Existing

Over the past two decades, the use of larger and deeper draft ships has resulted in ever-increasing pressure to provide deeper draft channels and berths. In particular, crude oil tankers have increased dramatically in size to take advantage of economies of scale. At present, the majority of the crude coming into Berth 121 comes on vessels that are forced to significantly light-load due to the draft constraints in the Main Channel discussed above. There are great opportunities for increasing efficiencies of existing operations through deeper channels to allow the larger crude carriers to call fully loaded.

Future

All future projections indicate the Nation's trade will continue to experience growth from the Pacific Rim although at a more moderate rate. Future projections show that as Alaskan sources are depleted, the Nation's long term energy needs will be met from foreign oil sources. Although there is a possibility that additional domestic sources will be developed, the size of those reserves is not expected to be significant enough to impact the region's projected imported energy needs. Consequently, the longer haul distance from foreign sources will call for even deeper channels to accommodate the more efficient ultra large crude carriers (greater than 300,000 DWT).

FIGURE III-1 MAIN CHANNEL AND EXISTING DEPTHS



EXISTING CONDITIONS WITHOUT PROJECT

Navigation Constraints

There are three areas where the Long Beach channel is physically constrained. The first area is Queens Gate, where the distance between the breakwaters is about 1800 feet at Mean Sea Level. the channel is also constrained between the end of the Navy mole and Pier F, where the distance between these features is just under 1000 feet. The third constraint exists between Pier D and Pier E where the minimum distance between these two features is 500 feet. These three constraints are width related and do not impose constraints on the draft or height of vessels.

Berth 121 Facilities

Berth 121 pumping and storage facilities have a capacity to offload about 150,000 Metric Tons of crude a day, with direct pipelines to major refineries ARCO, UNOCAL, Ultramar, and several other companies. Although refinery capacity is not expected to increase in the Los Angeles Basin, planned improvements (with and without project condition) will raise tankage capacity to over 350,000 MT a day to allow for importing higher foreign grade crudes and blending for refinery operations. If vessels called at Berth 121 carrying over 200,000 MT, some additional landside pumping and tank capacity would have to be built to enable offloading of the vessel in a reasonable time. The existing depth at Berth 121 is -76 feet, MLLW which could accommodate vessels up to 365,000 DWT, light loaded.

Historic Throughput

Berth 121 is used almost exclusively for receipt of crude oil shipments. Tables III-1 and III-2 present crude petroleum historic throughput at both San Pedro ports and Berth 121, respectively. Since 1974 a majority of the crude oil passing through the combined harbors has been Alaskan.

In recent history, Berth 121 handled up to 80% of total crude oil imports to the Ports. This is primarily a result of channels which allow deeper draft vessels to take advantage of a shift to Alaskan sources in the mid-1970's when North Slope oil reserves became available. Prior to development of North Slope reserves Berth 121 handled from 40-60 percent of total crude oil throughput (see Economics appendix). Contracts with refineries that shifted from Los Angeles to Long Beach Harbor have stabilized this throughput at 75 to 80% of total crude over the last decade. It has been assumed that Berth 121 will retain its current 80 percent share of total trade because of the needs of the users (refineries) and tankerage capacity for Berth 121 as compared to current and planned future capacities for Port of Los Angeles. This is consistent with the recently approved feasibility study for Los Angeles and Long Beach Harbors.

In 1987, 90% of the throughput for Berth 121 was Alaskan crude oil (90% of 14.4 million metric tons). Throughput at Berth 121 peaked at 19.3 MMT during the oil embargo and subsequent period of oil shortages on the west coast in 1980. Since that time, imports declined and then rose slightly.

TABLE III-1 HISTORICAL THROUGHPUT OF CRUDE (SHORT TONS)

Year	LB	LA	Total Foreign Imports	% Split LB	% Split LA	LB	LA	Total Domestic Imports	% Split LB	% Split LA	Total Foreign Domestic	Total % Split LB
1970	2,314,397	1,612,828	3,927,225	59%	41%	4,309,900	2,439,983	6,749,883	64%	36%	10,677,108	62%
1971	3,500,680	3,639,572	7,140,252	49%	51%	4,424,244	2,668,878	7,093,122	62%	38%	14,233,374	56%
1972	3,923,813	4,195,742	8,119,555	48%	52%	3,885,471	2,021,283	5,906,754	66%	34%	14,026,309	56%
1973	6,823,131	5,624,753	12,447,884	55%	45%	4,038,674	1,916,169	5,954,674	68%	32%	18,402,727	59%
1974	6,275,112	6,032,727	12,307,839	51%	49%	4,269,474	1,843,650	6,113,124	70%	30%	18,420,963	57%
1975	7,974,916	9,369,331	17,344,247	46%	54%	3,988,238	2,174,606	6,162,844	65%	35%	23,507,091	51%
1976	11,001,389	8,078,695	19,080,084	58%	42%	3,690,965	2,269,991	5,960,956	62%	38%	25,041,040	59%
1977	12,455,313	9,568,700	22,024,013	57%	43%	4,436,396	3,136,028	7,572,424	59%	41%	29,596,437	57%
1978	3,954,642	7,551,810	11,506,452	34%	66%	9,984,975	4,808,935	14,793,910	67%	33%	26,300,362	53%
1979	2,996,422	5,353,351	8,349,773	36%	64%	11,152,061	6,955,048	18,107,109	62%	38%	26,456,882	53%
1980	3,613,981	3,557,306	7,171,287	50%	50%	15,615,412	5,301,958	20,917,379	75%	25%	28,088,666	68%
1981	2,740,881	2,388,225	5,129,106	53%	47%	13,612,081	3,689,397	17,301,478	79%	21%	22,430,584	73%
1982	1,183,054	1,078,054	2,261,108	52%	48%	14,406,675	3,902,125	18,308,800	79%	21%	20,569,908	76%
1983	1,075,131	1,430,086	2,505,217	43%	57%	15,384,693	2,786,207	18,170,900	85%	15%	20,676,117	80%
1984	952,732	1,198,730	2,151,462	44%	56%	16,375,837	2,826,351	19,202,188	85%	15%	21,353,650	81%
1985	732,741	964,021	1,696,762	43%	57%	15,506,991	2,640,683	18,147,674	85%	15%	19,844,436	82%
1986	591,458	555,076	1,146,534	52%	48%	16,387,164	3,683,612	20,070,776	82%	18%	21,217,310	81%

Source: Waterborne Commerce of the United States, Years 1970-1986.

TABLE III-2 HISTORIC THROUGHPUT, BERTH 121

Year	Throughput in Metric Tons
1984/85	13,007,000
1985/86	14,175,000
1986/87	14,318,000
1987/88	15,848,000
1988/89	17,465,000
1989/90	17,869,000
1990/91	16,115,000
1991/92	16,906,000
1992/93	15,614,000
1993/94	15,699,000

Existing Trade Routes

The primary trade route served by crude oil tankers using Berth 121 is the Alaska Route, 2,240 miles one-way. Alaskan crude oil dominates the Berth 121 trade for a number of reasons, including existing refinery operations. As Alaskan crude oil reserves decline in the near future, it is anticipated that there will be a steady shift towards distant sources. Trade route distances to the primary destinations are shown in Table III-3.

TABLE III-3 TRADE ROUTE DISTANCES

Trade Route	Distance (miles)
Alaska	2,240
Far East	8,250
Persian Gulf	11,575
Source: WEFA San Pedro Bay Cargo Forecasting Project, 2020	

Existing Fleet

Table III-4 presents a summary of vessel deliveries at Berth 121 from July 1991 through November 1994. Vessels presently serving Berth 121 currently range from 70,000 DWT to 262,000 DWT, with a majority of deliveries made by two vessels of 188,000 DWT, and two vessels of 262,000 DWT.

TABLE III-4 EXISTING VESSEL FLEET, BERTH 121 CALLS AND DELIVERIES FOR JULY, 1991 THROUGH NOVEMBER, 1994

DWT	Drft	No. of Calls	#of call w/max load	Deliveries Metric Tons (1,000)	% Total
262	67.2	45	44	9,620	22%
262	67.1	46	45	10,224	23%
215	64.5	6		292	1%
191	59.3	31		NA	NA
191	59.3	5		854	2%
188	59.3	64	47	9,997	22%
188	59.3	68	45	10,821	24%
174	57.3	10		1,013	2%
174	57.3	6		713	2%
153	57.3	10		1,024	2%

Existing operations emphasize use of the largest, most efficient vessels which can be accommodated by existing navigation channels, with over 94% of cargo delivered by vessels which must be light-loaded or lightered, and which must use high tides to enter the harbor. The largest vessel that can access Berth 121 fully loaded is about 170,000 DWT, with a design draft of about 57 ft.. Vessels up to 265,000 DWT call at the berth, but they are light loaded and also utilize 3 feet of tide. Presently, vessels of 188,000 DWT light-load by about 15,000 Metric Tons in order to reduce their draft to 57 feet, and the 265,000 DWT vessels light load by about 40-50,000 Metric Tons.

Existing Vessel Operations

Vessel operating rules and regulations outside the harbor entrances have been developed over the years as a result of past experience. The rules and regulations are dynamic and are continuously being updated by the USCG with input from the pilots, Ports, U.S. Navy, shipping lines, and other involved entities. They are published in the Code of Federal Regulations (CFR) and U.S. Coast Pilot, on nautical charts, and in port tariffs.

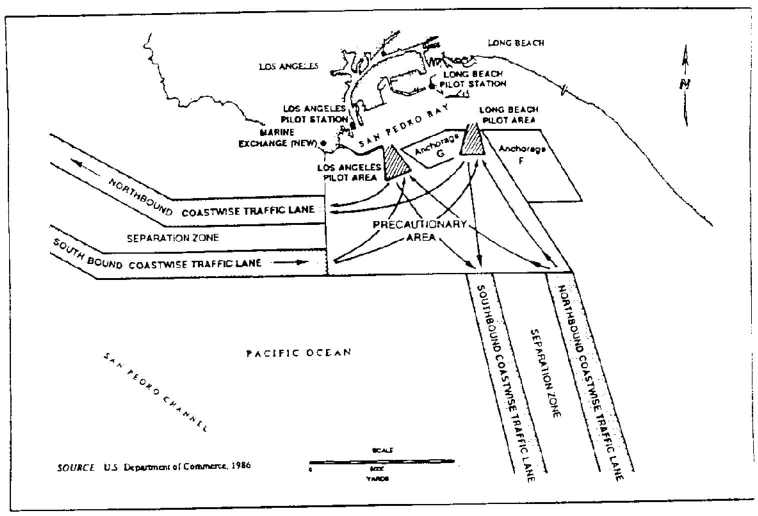
The Vessel Traffic Separation System (VTSS), shown in Figure III-2, is vessel traffic lanes established by the USCG and approved by the International Maritime Organization (IMO). The VTSS consists of one-way vessel traffic lanes separated by a 2-mile-wide separation zone. The VTSS lanes meet near the harbor at the Precautionary Area. Vessels are warned to use extreme caution in this area since cross traffic is common.

Within the Ports, speed limits and local rules are established and enforced by Port authorities (the Port Police of the Harbor Department in the Port of Los Angeles and the Executive Director of the Harbor Department in Long Beach). In general, the Harbor speed limit in narrow channels is 6 knots.

Arrival Procedures

Vessels usually call the pilot station one to two hours before arrival to request a pilot. Large liquid and bulk carriers generally call the pilot station on initiating their trip to the Ports to obtain a window for using tides, if needed, and to schedule their arrival. When these larger vessels come into the Port, current practice is to prohibit other vessels from moving on the channels. The pilot station enters this information into an online computerized Vessel Movement Reporting System (VMRS), that links pilots from the Port of Los Angeles, Port of Long Beach, and U.S. Navy; the Marine Exchange; and the USCG Captain of the Port. The pilot station then orders the necessary tugs. Vessels usually report their movements to the Vessel Traffic Information System (VTIS) operated by the Marine Exchange upon entering the Precautionary Area. The pilot boards a vessel outside of the breakwaters in or beyond the pilot area and guides the vessel to anchorage or dock.

Figure III-2. Vessel Traffic Separation System



Tankers approach the harbor through Queens Gate under their own power at a maximum speed of 5 knots. Tug assistance begins from the entrance through all reaches of the channel. Once in the harbor, maximum speed in the channel is 3-5 knots. Pilot services indicate that tankers that are draft constrained delay entrance until a minimum tide of +2.5 to + 3 feet MLLW occurs to provide minimum underkeel clearance. This occurs at least once in every 24-hour period. Larger tankers (262,000 DWT) are light-loaded and still utilize tides to maximize their load. Near the terminals, tankers are assisted by tugs and operate at 3 knots or less.

Departure Procedures

A vessel requests a pilot from one to two hours before sailing. Tugs are ordered at this time, as well. The pilot station enters departure information into the VMRS. The pilot boards the vessel at dock or anchor, guides the vessel through the harbor entrance, then leaves the vessel in or beyond the Pilot Area.

FUTURE CONDITIONS WITHOUT PROJECT

Cargo Projections (2020 and 2040)

The most recent studies of cargo movement projections through the San Pedro Ports was done by Wharton Econometric Forecasting Associates and Manalytics, Inc. (WEFA). These studies included San Pedro Bay Forecasting Project 2020, under contract to the Ports of Los Angeles and Long Beach, and the San Pedro Bay Forecasting Project 2040, an extension of the 2020 forecast, commissioned by the US Army Engineer District, Los Angeles. These projections are shown in Table III-5. The key assumptions underlying the outlook for crude throughput in this forecast are given below.

WEFA San Pedro Bay Forecast.

Four key issues underlie the outlook for crude trades through the combined Ports of LA and LB, and these are outlined below:

a. Based upon forecasts in the Fall 1994 "Revenue Sources Book: Forecast and Historical Data" produced by the State of Alaska and also upon the 1995 "Annual Energy Outlook" produced by the Energy Information Administration of the Dept. of Energy, it was assumed that no development of the Alaskan National Wildlife Reserve (ANWR) will occur in the project life. This scenario was considered to be the appropriate scenario and was used in this evaluation. This assumption was also approved in 1992 when the Los Angeles Harbor Study was approved. As Alaska sources are depleted, more crude will be imported from the Far East and Persian Gulf Regions.

b. Onshore and Off-shore production in California and along the West Coast in general is also anticipated to be limited, primarily by environmental constraints.

c. Synfuels development is not anticipated to have a significant impact on world trade in petroleum and petroleum products until the price of these commodities reaches levels which make synfuels development economically feasible. This assumption is reflected in crude petroleum projections; demand for petroleum does not begin to decline until synfuels development is projected to occur in 2010 to 2040.

d. The energy requirements of the United States and the LA/LB market area will continue to increase over the forecast period. Crude petroleum imports are expected to meet a portion of these needs, but will reflect limited growth based on existing refinery capacity in the basin. Strict air quality constraints will shift the dependence to petroleum products. The actual imports for crude petroleum will see slight growth until 2020, when demand decreases. Overall changes are less than 1% over time.

e. The WEFA forecast is generally consistent with recent forecasts done by the Department of Energy Information Administrantion and the State of Alaska, as shown in Figure III-3.

While a majority of crude oil shipments through Berth 121 currently originate in Valdez, Alaska (distance: 2,240 miles), shipments from Alaska are anticipated to decline rapidly as existing reserves are consumed, with a resulting shift to sources in other areas, primarily the Persian Gulf (distance: 11,575 miles). As Table III-1 indicates, shipments are also anticipated to arrive from a number of other sources.

Shipments from Latin America and domestic sources other than Alaska would not be limited by existing channel depths, since vessels are currently limited by the foreign (or other domestic) port. The trade routes of Latin America and "other domestic" were therefore not considered in the economic analysis. The throughput from the Far East and South East Asia, Persian Gulf, and Alaska is thus the only element of this trade of concern for determining the feasibility of navigation improvements to Berth 121.

FIGURE III-3 CARGO FORECAST COMPARISON

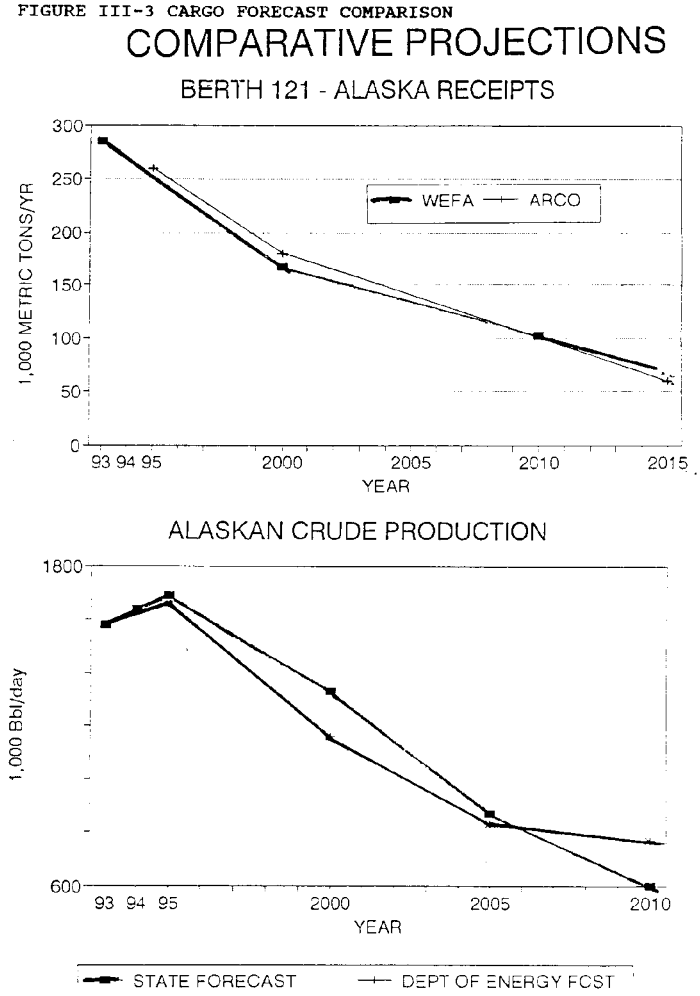


TABLE III-5 CRUDE PETROLEUM SHIPMENTS, BY TRADE ROUTE
2000-2040, LA/LB HARBORS WEFA

Trade Route	Dist (miles)	2000	2010	2020	2030	2040
Far East	8,250	1,600	1,200	1,000	900	800
Per. Gulf	11,575	4,000	7,250	9,000	9,250	10,000
Alaska	2,240	10,582	6,439	3.961	2,295	1,887
Other Domestic		1,213	1,148	1,274	1,412	1,421
SE Asia		935	1,000	1,718	1,818	1,500
Lat. Am.		1,463	3,032	3,460	2,615	2,451
Total		19,793	20,069	20,413	18,239	18,009

Berth 121 Forecast

From this WEFA forecast for both San Pedro Bay Ports, projected throughput for Berth 121 in the Port of Long Beach was broken out based on the following assumptions:

1. It is expected that Berth 121 will retain its current share of total trade because of the needs of the users (refineries) which receive shipments through Berth 121 and existing and planned tankerage capacities at both San Pedro Ports. The current distribution of crude petroleum deliveries to the Ports, and the distribution assumed for the period 1990-2040 is 80% Port of Long Beach, 20% Port of Los Angeles.

2. In addition, Berth 121 will handle all of this 80% since it is the only facility available in the Port of Long Beach that can handle the crude. There are no recognized factors that would cause a shift in this share.

Future Trade Routes

Table III-6 presents the projected volumes of crude from those sources where ultra large vessels would likey be used for deliveries at Berth 121. An analysis was performed to project the ports likely to be involved in this trade.

Table PROJECTED CRUDE PETROLEUM IMPORTS 2000-2050 BERTH 121, BY TRADE ROUTE, ASSUMING NO DEVELOPMENT OF ANWR PETROLEUM RESOURCES

	Imports (1,000's metric tons)					
Trade Route	2000	2010	2020	2030	2040	2050
Far East and SE Asia	2,028	1,760	2,174	2,174	1,840	1,840
Alaska	8,465	5,152	3,169	1,836	1,470	1,470
Persian Gulf	3,200	5,800	7,200	7,400	8,000	8,000
Total	13,693	12,712	12,543	11,410	11,310	11,310

The Census Bureau of Records was consulted to determine historic shipments to foreign ports. A list of the ports expected to be on the trade routes for the Persian Gulf and Far East and their maximum operating draft (including any usable tide and using a minimum safe underkeel clearance) is shown on Table III-7 and III-8. The actual ports of call vary depending on existing contracts with shippers, energy policy, and buying practices. The ports listed have been or may be used at any time depending on these variables.

Table III-7 MAJOR FAR EAST CRUDE EXPORTING PORTS

Country and Port	Max Operating Draft (ft)
Sriracha, Thailand	50
Singapore, Singapore	74
Sumatra	
Kerteh	66
Miri	55
Palau Sambu Island,	29
Moluccas	26
Bangkok, Thailand	56
Dumai, Moluccas	71
Huangdao, N. China	

Table III-8 MAJOR PERSIAN GULF CRUDE EXPORTING PORTS

Country and Port	Max Operating Draft (ft)
Juaymah, Saudi Arabia	103
Jubail, Saudi Arabia	98
Rastanura	69
Kharg Island, Iran	92
Fateh, U. Arab Emirates	100
Zirku Is, U. Arab Emirates	88

Fleet Projections

An analysis of the existing and future vessel fleet forecast to serve the Ports of Los Angeles and Long Beach was conducted by Temple, Barker and Sloane, Inc (TBS). The TBS forecast was based on examination of world fleet tanker availability and usage and trends in the replacement of vessels in that fleet and additional vessels were needed to meet throughput projections. The trends for the tanker fleet indicate in gerneral the use of the ultra large size vessels increasing in usage to obtain economy of scale savings, particularly on the long haul trade routes.

An analysis of the tanker fleet expected to be used in the future at Berth 121 under existing channel conditions is presented in the Economics Appendix. In general, the analysis indicates the limiting depths at the Port of Long Beach is constraining the sized of vessels that can be used at all of the trade routes, including Alaska, and foreign sources. In general, the efficient size vessels that can be expected to be used under present channel depths is consistent with the present fleet sizes, and will range from 150,000 to 200,000 DWT.

Without Project Transportation Costs

The average annual transportation costs for crude deliveries to Berth 121 under the without project condition are given in Table III-9 by region. These costs reflect the existing and future volumes of crude long haul trade routes of Alaska, Far East and Persian Gulf, and tanker fleet expected to be used based on present channel constraints at the Port of Long Beach. The costs are based on present vessel operating costs developed by the Water Reources Support Center. The detailed computations and discussion are found in the Economics Appendix.

Table III-9 Without Project Avg. Annual Transportation Costs

REGION	AVG. ANNUAL COST ($1,000)
PERSIAN GULF	$107,338
FAR EAST	$25,671
ALASKA	$36,499
TOTAL	$169,508

ENVIRONMENTAL CONSIDERATIONS

The San Pedro region including land and water areas provides a wide diversity of resources and activities. Commercial activities include navigation, heavy industries, Naval operations, and other government facilities. Recreation includes civilian marinas and the Queen Mary complex. Surrounding the port complex are residential, commercial, and industrial areas which have benefitted economically from the growth of the Ports. The coexistence of these resources and activities has been successful through careful consideration and planning by the Port. The Port has worked to identify impacts of harbor activities in order to avoid, or at least minimize, impacts through mitigation programs.

There are numerous planning considerations in the expansion of the Long Beach Harbor area which are related to environmental concerns and the well-being of the surrounding population. Impacts on water quality and air quality are also of concern. In addition, Navy and Coast Guard operations must be considered so that plans do not interfere with the ability of these operations to respond to the Nation's military needs.

Concerns specific to this project are primarily related to placement of dredge material. As discussed in later sections, some of the alternative placement sites may be in a Least Tern foraging area. This is a Federally Endangered Species, and any adverse impacts to this species must be avoided.

IV FEDERAL PROJECT PLAN FORMULATION

GENERAL

The Federal interest in navigation is derived from the Commerce Clause of the Constitution and is limited to the navigable waters of the United States. Federal navigation improvements in or on these waters are in the general public interest and must be open to the use of all on equal terms. When facilities to accommodate and service vessels or load and unload cargo are required as associated facilities to achieve the benefits of a Federal project, they are entirely the responsibility of local interests.

The general navigation features in harbor areas considered eligible for Federal participation include channels, jetties and breakwaters, and basins or water areas for vessel maneuvering, turning, passing, mooring, or anchoring incidental to transit of the channels. Navigation improvements also include activities such as removal of wrecks and obstructions, snagging and clearing for navigation, drift and debris removal, bridge replacement or modification, and mitigation of project induced shore damage.

PLANNING OBJECTIVES AND EVALUATION CRITERIA

Planning Objectives

Based on the analysis of the identified problems and opportunities and the existing physical, human and environmental conditions of the study area, planning objectives were identified to direct formulation and evaluation of alternative plans.

1. Optimize the efficiency of transporting existing and future crude petroleum commerce through the Port of Long Beach.

2. Preserve and improve environmental resources to the maximum extent practicable.

Objective 1 is fundamental to improving the efficiencies of existing and future operations with respect to transportation costs. These objectives are consistent with Federal planning guidelines and the primary goal of contributing to the Nation's economic development (NED).

Objective 2 includes the specific objectives of alleviating existing and future air quality and vessel traffic impacts resulting from inefficient cargo handling operations. It also relates to meeting the NED objective in a manner that is consistent with applicable environmental law, regulations, and policy. This reflects conformance with Federal, state, and local environmental statutes, regulations, and policies, and is characterized by the following four environmental goals: 1) Avoid any unacceptable adverse impact on environmental resources, 2) Where impacts are not avoidable, they should be minimized to the greatest possible extent, 3) Any remaining unavoidable impacts must be mitigated to insignificance, and 4) Improve, or restore environmental quality wherever possible without adding undue cost or compromising the primary objectives.

PLAN FORMULATION APPROACH

The approach taken in formulating a project involved several steps that screened or narrowed the development and consideration of alternative plans towards selection of the best project to meet the above stated objectives. These steps include: (1) Determination of the most viable measures to provide positive contributions to the planning objectives; (2) Determination of channel improvement requirements; (3) Determination of the most viable options for disposal of dredged material; (4) Optimization of channel improvements based on NED and environmental consideration. The optimization of the channel included consideration of the Port of Long Beach's request to receive credit for channel deepening completed by the Port as part of the Pier J expansion project; and (5) Evaluation of final channel deepening and disposal alternatives and selection of the best plan.

The assessment and evaluation of measures and plans is based on comparisons under without project and with project conditions and addresses national economic development, environmental, regional economic, and other social effect considerations in accordance with Federal law and Corps of Engineers Planning policies and procedures.

NO ACTION PLAN (WITHOUT PROJECT CONDITION)

The No Action Plan reflects the existing and most probable future physical, economic, environmental and other conditions of the Port assuming no Federal or non-Federal action is taken towards addressing the stated planning objectives. The No Action Plan establishes the without project condition that is used as the basis for assessing economic and environmental and other impacts of any proposed improvements.

In regard to the first planning objective, the No Action Plan reflects the existing and most probable future operations and costs for transporting crude petroleum through the Port of Long Beach as described in the previous Chapter. In summary, the No Action Plan is based on continued shipping of crude petroleum to Berth 121 on vessels limited by channel depths in the approach and entrance channel. This includes light loading of tankers that presently occurs with vessels moving crude from Alaska, and constraints on the economy of scale of vessels used to transport the increase in crude from Far East and Persian Gulf sources as Alaska reserves are depleted in the future.

In regard to the second objective, it is expected that air quality will continue to improve from present conditions as the State Implementation Plan becomes effective in the future. Water quality is also likely to improve as the effectiveness of actions taken by the Port and others becomes more effective in minimizing contaminants entering into the San Pedro Bay waters. In general, environmental habitat areas of significance such as least tern nesting and foraging areas will continue to be protected. Other land uses will be related to Port operations and possibly recreation and other public use activities, that will be primarily related to landside activities.

MEASURES CONSIDERED TO MEET PLANNING OBJECTIVES

The formulation of plans to meet the needs at the Port examined all viable structural and non-structural measures primarily focusing on addressing the primary planning objective. Non-structural measures would involve changing operations such as (1) use of tides (2) lightering (3) use of other ports (4) use of other terminals in San Pedro Bay. Structural measures are actions which would involve construction or modification of improvements to meet the primary objective such as (1) deepening and widening channels, or (2) monobuoys. Based on examination of the alternative measures considered viable to improve the efficiency of operations at Berth 121, the following conclusions were made.

Non-Structural Measures

1. **Use of Tides.** Deep draft tankers are presently using up to 3 ft. of tide to maximize loads and are expected to continue to use tides in the future. Accordingly, use of tides is considered a viable measure.

2. **Lightering.** Lightering involves providing or designating an area with adequate depth to allow a fully loaded vessel to come in, transfer part of its load to other smaller vessels until the vessel draft is at a depth it can transit available channels to the terminal. Since the only area available with adequate depth for the larger vessels to come in fully loaded is outside the breakwater, in open ocean conditions, the potential for spills during transfer operations is relatively high. In addition the extra cost of lightering including use of smaller vessels, and delay of the large draft vessel can be considerable. Accordingly, lightering was eliminated from consideration for environmental and economic reasons.

3. **Use of Other West Coast Ports.** Refineries associated with deliveries of crude petroleum to the Port of Long Beach are

located in the vicinity of Los Angeles and Long Beach Harbor. There are no other Ports on the West Coast than the San Pedro Ports with available depths and terminal capacities to allow for more efficient movement of crude or products. Any future deepening of the harbors would require costly facilities and pumping to the San Pedro area. Accordingly, the use of other harbors was eliminated from further consideration.

4. **Use of Other Terminals in San Pedro Ports.** All terminals in the Port of Los Angeles and Long Beach will be operating at or near capacity. The plans approved for the Port of Los Angeles would allow for deeper vessels, however existing and planned future facilities account for the Port of Los Angeles continuing to accommodate only 20 percent of the crude shipments to the San Pedro Bay harbors. In addition, the movement of tanks, pipelines, and other facilities can be extremely costly. Based on discussions with several terminal operators, it is estimated to cost over $50 million to move one facility. Accordingly, use of other terminals in San Pedro Harbor is not considered a viable measure.

Structural Measures

1. **Channel Improvement.** Improvements to the channel to Berth 121 are viable options that warrant consideration, since this would allow vessels to come in more fully loaded and allow larger more efficient vessels to call on the harbor.

2. **Monobuoys.** A monobuoy is an open-water moorage where ships are tied to a specially designed floating buoy anchored to the sea floor. The moored ship is free to pivot around the buoy in a weather-vane fashion in response to wind, wave, and tidal conditions.

   The use of monobuoy moorage was evaluated in the programmatic EIS/EIR for landfill development and channel improvements by the COE and Ports of Los Angeles and Long Beach (1985) and for the Pacific Texas (Pactex) project by the U.S. Department of Commerce, Los Angeles Harbor Department (LAHD) and Bureau of Land Management (BLM 1985) in developing plans for the proposed crude-oil off-loading system. However, the monobuoy alternative was considered nonviable when compared to fixed-berth alternatives. Monobuoy moorage is not preferred for the following reasons:

   1. To contain and control cargo spills, it would be preferable to locate the moorage in sheltered waters, such as in-shore of the breakwater. Dredging for navigation channels and turning basins would be needed for all moorage inside the harbor. The area needed for these activities could envelop a large portion of the harbor and would likely double or triple the amount of dredging required.

2. If monobuoys were constructed anywhere but the protected San Pedro Bay harbor areas, they would need to be located outside the existing navigational precautionary areas linking ocean shipping lanes to harbor entrances. This exclusion would place the monobuoys about 9 miles from onshore tank-farm locations, a distance beyond the maximum tanker-pumping range of 5 to 6 miles. Locating the monobuoys north or south of the precautionary area would situate the pipelines and/or terminal areas in heavily developed residential areas or areas such as the Palos Verdes shoreline and undeveloped Orange County coastline rather than in the industrialized San Pedro Bay Ports area.

The consideration of measures to meet the second planning objective is based on review of the above measures from the perspective of contributing to preserving and/or enhancing environmental considerations. In this regard, the only viable measure that may contribute positively to environmental aspects of the study area is the effects of channel deepening and associated benefits that could result from more efficient operations, such as reduced number of ship movements. Other potential benefits from channel improvements may involve beneficial use of the dredged material, which will be addressed later in this Chapter.

Based on the above, the only measures considered feasible are deepening the channel to Berth 121 and continued use of tides.

CHANNEL REQUIREMENTS

The second step of formulating a plan involves defining channel requirements needed to obtain economy of scale transportation savings from deeper loaded and larger vessels. This includes design of channel dimensions, determining dredging requirements, and analysis of the characteristics and quality of the material to be removed to create the designed improvements.

Basis for Design

The design of general navigation features was accomplished in accordance with Corps criteria, procedures, and standards, and reflects the actual and projected vessels calling on the Port of Long Beach and their operating procedures as discussed with the terminal operators, shippers, pilots, and officials from both Ports. The design of port facilities and other associated features was performed by the Ports and reviewed by the Corps from the standpoints of adequacy for safety and completeness and to determine reasonableness of costs for implementation. The details of the designs of general navigation features and associated features are presented in the Design Appendix.

The Design of Navigation Improvements includes defining navigation channel requirements for the approach and entrance channel to Long Beach Harbor, as well as the main channel and turning basin to Berth 121. Although these latter areas have already been dredged by the Port of Long Beach, the Port has requested credit for channel deepening they completed as part of Pier J Expansion project. Accordingly, channel design requirements includes design of navigation improvements needed inside the breakwater, and estimates of volumes needed to be dredged inside the breakwater based on channel conditions prior to channel dredging accomplished by the Port.

Queing Analysis

The purpose of a vessel traffic queuing analysis is to determine whether one way traffic is sufficient to handle all deep draft traffic into and out of the study area or if two way traffic would be required. One way traffic is feasible if and only if single vessels alternating inbound and outbound, are sufficient to handle the maximum future traffic. For this trade, one way traffic is sufficient to handle all existing and future vessel calls, as the frequency never exceeds one call every week or two.

Design Vessels

Design vessels were determined by examining the drafts of ships currently transiting the project reaches, and those of vessels with a potential of providing economy of scale transportation savings on long haul trade routes. At each channel depth analyzed, the largest vessel expected to utilize the channel based on economic efficiency of the various size vessels at that depth was utilized as the design vessel.

The design vessels considered are liquid bulk crude carriers 265,000 dead-weight ton (265K DWT), a 300,000 dead-weight ton (300 KDWT) liquid bulk (crude) carrier, a 325,000 dead-weight ton (325K DWT), and a 365 KDWT vessel. These vessels are representative of the most efficient size classes on the longer trade routes. Table IV-1 shows the characteristics of these vessels. Applicable lengths and widths were extracted from the Water Resources Support Center Vessel Characteristics data of 1995.

Table IV-1. Design Vessel Characteristics

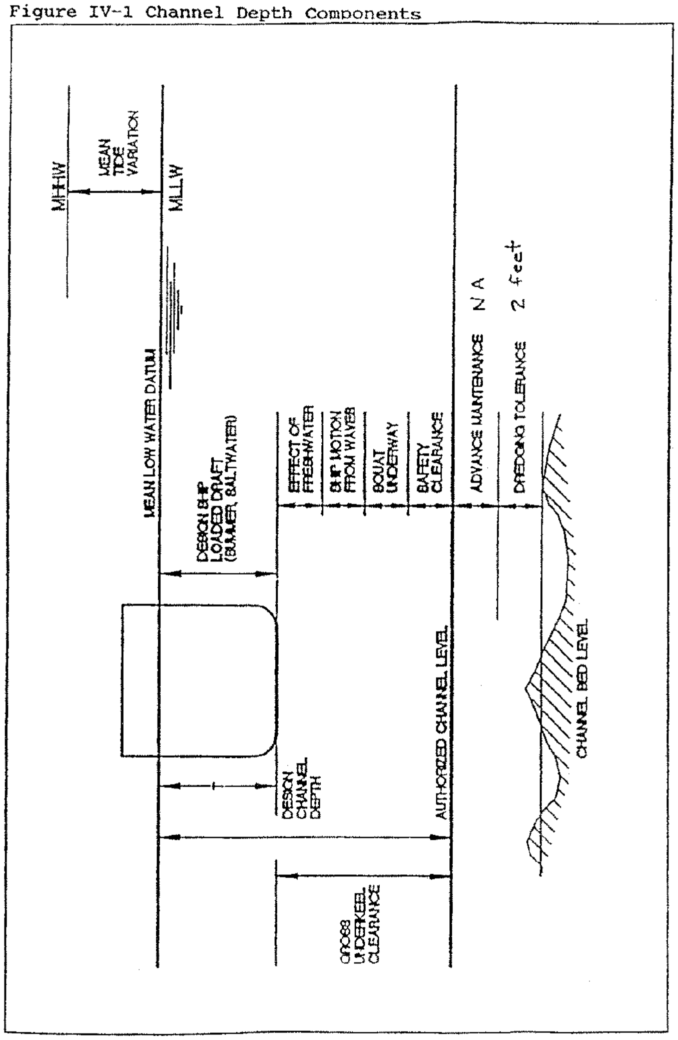
Vessel Size (DWT)	265K	300K	325K	365K
Beam (feet)	178	185	190	195
Length (feet)	1100	1132	1158	1178
Fully-loaded Draft (feet)	67.8	68.7	72.1	73.8

Information contained in the Temple, Barker, and Sloan Fleet Forecast Report (TBS), completed for the Los Angeles District in 1987, provided information on the design characteristics of future tanker fleets. The study, which was based on ship orders and coordination with the Maritime Administration, indicates the maximum beam and length of vessels in the 300,000 - 400,000 DWT class is 193 feet and 1210 feet respectively, which is generally consistent with Water Resources Support Center data.
Based on the TBS data, and in view of the minimal differences between the beam and length of the 325K and 365K, it was decided that the 325K vessel would be representative of the maximum vessel size used in the design of channel widths and turning basins. This is further supported by the fact that the design of channel width and turning basin dimensions would be based on rounding up to the nearest 25 feet. In addition, ship simulation studies used to design the channel widths for the Port of Los Angeles project included consideration of adverse weather and current conditions.

Draft and Underkeel Clearance

The purpose of deepening the channel is to allow vessels to load deeper thereby carrying larger loads at substantial transportation savings. Vessels moving in navigation channels must maintain certain clearance between their hulls and the channel bottom. Channel depth is based on the loaded draft of the design vessel plus underkeel clearance. The underkeel clearance is determined by observing actual operating practices and also by considering vessel squat, the potential dynamic effects upon the vessel, and safety clearance as shown on Figure IV-1.

Figure IV-1 Channel Depth Components



Actual Operating Practices.

Guidance received from the Washington Level Review Center in September 1993 on the Ports of Los Angeles and Long Beach Feasibility Study directed the District to use actual operating practices to establish minimum underkeel clearance.

Table IV-2 presents actual arrival information from the Port of Long Beach indicating that in some instances the available depth was only 7 percent greater than the recorded vessel draft. In fact, approximately 30% of the vessels calling at Berth 121 in 1987 (the only year for which this data is readily available) arrived with less than 10% underkeel clearance, and in some cases were as low as 6%. Minimum underkeel clearance is therefore established at 7% using the same criteria that was applied in the Port of Los Angeles Study.

This minimum underkeel clearance actually occurs outside the breakwater because the minimum controlling depth of 60 feet extends approximately 2000 feet seaward of Queen's Gate (the 61' contour is not reached until this point). For this reason, no additional underkeel clearance was added for the channel design outside the breakwater.

Accordingly, the underkeel clearance required for channel design both inside and outside the harbor breakwaters, is established as seven percent (7%) of the vessel fully-loaded draft. Further discussions with the Long Beach pilots and shippers, however, revealed that these vessels are trimmed about 3 percent on the average, and vessel drafts are taken at the lowest point on the vessel. The additional trim required is taken into account in loading estimates in the economic analysis.

For the Port of Los Angeles Feasibility Study, actual arrival information for vessels calling at the Port of Los Angeles was used as the basis for computing underkeel clearance of 7% also, and was presented and approved in that report.

Table IV-2 Actual Drafts on Arrival - Min. Underkeel Clearance

VESSEL DRAFT	TIDE (FT.)	U.K.CLRNC.	% UNDERKEEL
56.0	1.0	4.3	7.2
55.5	0.0	3.75	6.3
56.0	1.0	4.3	7.2
56.0	1.0	4.3	7.2
56.0	1.0	4.3	7.2
56.0	0.5	3.7	6.4
56.0	0.3	3.3	5.7
56.0	1.0	5.0	8.4
56.0	0.3	4.3	7.2
56.0	0.5	4.5	7.6

Channel Width

The provision for safe navigation for all vessels using the channel is of paramount importance in the design of navigation channel width and alignment. There are, however, constraints on channel width which may limit the possible expansion or realignment of the channel. The requirements for channel width also must consider the maneuverability of the design vessel and physical wave, current and other conditions in the maneuvering area.

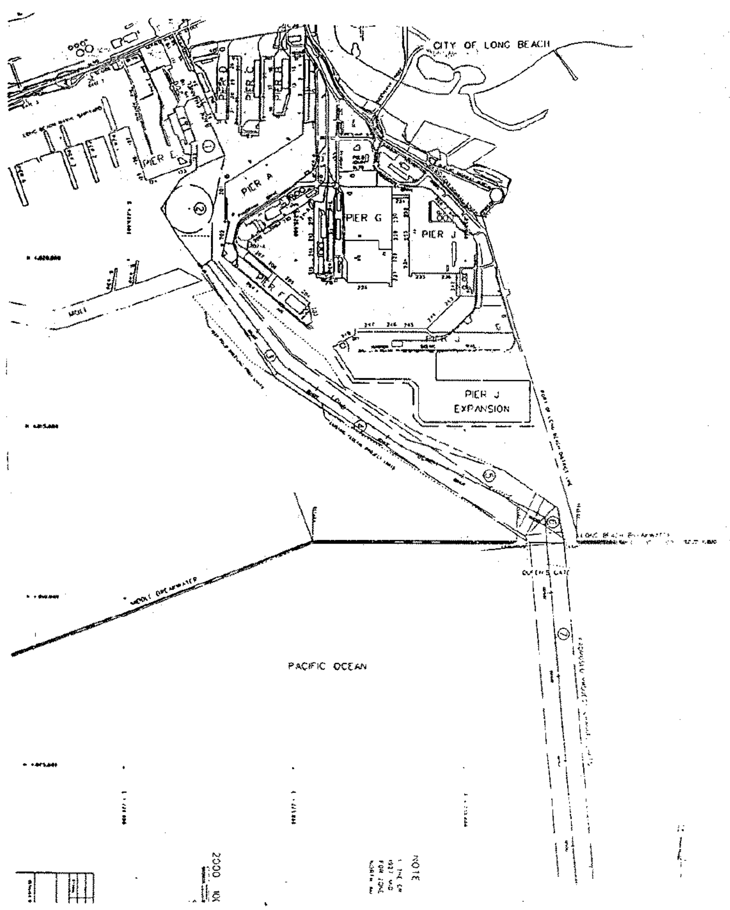
The width design considers one-way vessel traffic and addresses seven reaches within this project, shown in Figure IV-2. Table IV-3 presents the channel width dimensions at each section of the channel for the different design vessels. The channel width designs are discussed in detail in the Design Appendix.

Ship Simulation Studies. In 1993-94 at Marine Safety Institute, Newport, Rhode Island, a ship simulation study was conducted under the direction of the Waterways Experiment Station, Hydraulics Lab (Hewlett, 1994). The purpose of this study was to determine the necessary channel width and alignment required for safe navigation of vessels expected to be used with the approved navigation plans for the Port of Los Angeles. The entrance channel turn used in these simulation runs is very similar to the entrance channel turn required to navigate the Port of Long Beach channel, and was examined to validate the safety and efficiency of the channel design. A request for a waiver of required ship simulation modelling for the Port of Long Beach has been submitted to HQUSACE, and approval is expected. This request is included in the Design Appendix.

Table IV-3. Channel Widths for Design Vessels

Channel Width (Feet)			
Design Vessel	325K-365K DWT	300K DWT	265K DWT
Approach (Straight)	1200	1120	1025
Bend at Queens Gate	1300	1300	1300
Entrance	600	575	550
Bend at Pier J Exp	900	875	825
Channel adj. Pier J	600	575	550
Turning Basin	1400 dia	1400 dia	1400 dia
Channel adj. to berth	400	400	400
Berthing Area	200	200	200

Figure IV-2 Channel Design for 325/365 KDWT Tanker



Berthing Area and Wharf.

Berth. The berthing area is at Berth 121 on Pier E in the Port of Long Beach. The berthing area must accommodate the draft of the design vessel, as the navigation channels do. However, some of the channel design considerations such as dynamic effects need not be considered for the berthing area, so minimum underkeel clearances are reduced to about 4% of draft.

The existing dimensions of Berth 121 are 76 feet deep, 200 feet wide, and over 1200 feet long. The berth presently supports 262,000 DWT vessels presently being used for crude deliveries, with an overall length of 1100 feet and a beam of 178 feet, and has been determined to be sufficient to handle vessels up to about 365,000 DWT.

Wharf. The existing wharf adjacent to Berth 121 contains pumps and ladders which support off-loading of petroleum from deep-draft liquid bulk vessels. The Port of Long Beach has indicated that there is no need to modify the existing wharf.

Aides to Navigation

Aids to navigation in the existing channel consist of lights marking the entrance to the Long Beach channel on the ends of the Middle Breakwater and the Long Beach Breakwater at Queens Gate, and several fixed position navigation buoys along the entrance channel. The U.S. Coast Guard, Eleventh District, has indicated that construction of this project will require relocation of two buoys in the entrance channel and one buoy in the approach. Four new buoys would be established in the approach channel and four buoys would be established in the entrance channel. Ranges are usually requested by the pilots, and will be considered in the final design of the Recommended Plan.

MATERIAL DREDGING

Table IV-4 presents the volume of material needed to be dredged based on existing conditions and pre-Pier J construction. The volumes shown for existing conditions reflect new dredging needed to complete navigation channels at various depths (primarily the approach and entrance channel seaward of the breakwater), while the differences between the pre-Pier J estimates and existing conditions (the main channel inside the breakwater) reflect the channel dredging completed to minimum depth of -76 feet, MLLW by the Port of Long Beach as part of the Pier J expansion project, which would be considered for credit desired by POLB.

The volumes shown in Table IV-4 are based on the channel dimensions required using the most efficient design vessel for each depth. (The selection of these vessels is presented in the Economics appendix.) A dredge cut with side slopes of 1 vertical to 3 horizontal was used for channel sides, except at the Navy mole and berthing area where 1 on 1 slopes were considered stable. Overdepth dredging tolerance was designed at two feet for all areas of the project.

These calculations were done using three sources of hydrographic data: predredge hydrographic data for the Port of Long Beach Pier J Expansion project, National Oceanic and Atmospheric Administration (NOAA) bathymetric charts, and the November 1994 hydrographic survey conducted by Sea Surveyor, Inc.

Table IV-4 DREDGE VOLUMES

PROJECT DEPTH (FT. MLLW)	DESIGN VESSEL (1,000 DWT)	PRE-PIER J TOTAL DREDGING (1,000 CY)	EXISTING CONDITIONS NEW DREDGING (1,000 CY)	DREDGING COMPLETED BY POLB (1000 CY)
66	265	3,213	1,180	2,033
69	265	5,174	1,986	3,188
72	325	8,156	3,423	4,733
73	325	9,141	3,867	5,274
74	325	10,055	4,350	5,705
75	325	10,896	4,900	5,996
76	325	11,914	5,571	6,343
77	325	13,793	6,749	7,044
78	325	14,732	7,926	6,806

Sediment Quality

Sea Surveyor, Inc conducted geotechnical investigations, under contract by the POLB at the end of 1994 to determine sediment characteristics for the required new dredging including the approach and entrance channels to depths of 78 feet, MLLW, as well as samples from potential material placement sites. Table IV-5, below presents an analysis of the boring logs which appear to show fairly discrete layers of different material. The sand listed in this table is very fine-grained (0.1mm), and has an in-situ silt content of less than or equal to 30 percent. Layers refer to order of material type encountered below the ocean floor surface, but not all layers are continuous. The breakdown of material types lists layers in the Approach Channel and part of the entrance channel bend area totaling 5.3 million cubic yards.

TABLE IV-5
GEOLOGICAL LAYERS IN APPROACH CHANNEL AREA

Layer	Material Type	Quantity (1000 cy)
1	Sand	1,800
2	Clay	400
3	Silt	1,500
4	Sand	400
5	Clay	200
6	Silt	300
7	Sand	400
8	Silt	300

The remaining 0.3 million cy required for a channel depth of -76 feet MLLW is located in the remainder of the entrance channel bend area and in the main channel. This material type is expected to be either sandy-silt or silty-sand.

Combining like materials, the breakdown is estimated at 2,600,000 cy of fine sand (50%), 600,000 cy clay (10%), and 2,100,000 cy of silt (40%). Although these calculations are based on simple geometric assumptions, in actuality, the layer elevations fluctuate several feet. Because of this, only the top layer of sand is expected to be selectively dredgable by a hopper dredge, and this is the approximately 1.8 million cy of material, or 2.1 million cy if the additional material near the gate is found consistent with this top layer.

In addition to mechanical testing, chemical testing of the dredge material was performed to determine its compatibility with potential material placement areas. The result of these tests is presented in the following section of this Chapter.

Material Placement Options

The disposal of the dredged material considered a wide range of options which included careful consideration of beneficial uses of the material. These beneficial uses include consideration of using the material for beach nourishment to restore or protect nearby eroded beach areas; landfills needed to accommodate future development; and ecological restoration or enhancement, such as wetland restoration or creation.

A preliminary list of potential placement sites was developed based on beneficial uses and reasonably accepted locations based on recently approved projects. The following list is a brief description of these sites which are shown on Figure IV-3.

I. **Potential Beach Nourishment Sites.** The oceanfront shores along Alamitos Bay and down coast areas are severely eroded causing backshore development to be vulnerable to damage from coastal storms. The use of the dredged material for beach nourishment is desired by the City of Long Beach and downcoast communities. Possible options considered for placing the material for beach nourishment includes placing material directly on the beach to restore eroded areas; nearshore berm construction which would allow some material to move on shore for beach restoration and also dissipate wave energy effecting erosion and storm damage potential; and general disposal in the littoral zone to raise offshore bathymetry and keep suitable material in the littoral zone. The specific locations considered include:

A. **Peninsula Beach/5th to 18th St.** (Long Beach) Nearshore/Onshore - For placement at these beach areas, a direct pumpout hopper dredge would be used to place material either on the beach between +12 and -12 feet MLLW, or in a longshore mound between -15 to -25 feet MLLW, and the material would be graded to match existing beach profile elevations. Up to about 2 million cubic yards (MCY) could be placed here.

B. **Surfside/Sunset/Seal Beach Nearshore/Onshore** - For placement at these beach areas, a direct pumpout hopper dredge would be used to place material either on the beach between +12 and -12 feet. MLLW or in a longshore mound between -15 to -25 feet MLLW, and the material would be graded to match existing beach profile elevations. Up to about 2 MCY could be placed here.

II. **Potential Landfill Sites.** The use of the material at approved land fill sites would benefit in the development of the site and also benefit in minimizing or eliminating the impact on areas which were being considered for borrow material for the landfill. The Port of Long Beach has no current plans for needing the dredged material for landfill. The alternatives considered possible for this use of the material include:

C. **Port of L.A. - Pier 400** - Placement of the dredged sediment in a permitted landfill in the Port of Los Angeles (POLA) was considered as a beneficial use of the material. The Port of L.A. has indicated they could use about 2.0 MCY.

D. **Upland disposal** - Material would be pumped into a de-watering contained area on land and then trucked to an upland disposal site. There are few sites where the material would be accepted because of salt content.

III. **Potential Ecological Sites.** The use of dredged material for ecological restoration and enhancement is currently a high priority of the Corps of Engineers. In general, many of the wetland areas in the region have problems with too much material causing sedimentation or filling in of marsh and other wetland areas. There are no opportunities for creating a wetland with the material in the vicinity of the harbor due to the highly developed nature of the coastal area. There are a number of existing ocean pits which were created as a result of these areas being used for borrow material for nearby landfills. These pits are generally deep and wide areas that have a lower biological productivity than surrounding shallower areas due to lower dissolved oxygen and other problems such as trapping of contaminants. These ocean pits can also have adverse impacts on erosion based on trapping littoral material, or focusing wave energy to specific areas. A number of these pits exist in the immediate vicinity of Long Beach Harbor and are listed below.

E. **Pit at Mouth of Los Angeles River** (Queensway Bay Pit) - This pit is located in Queensway Bay, and goes from about -30 to about -60 feet MLLW in depth. It has a capacity of about 1 MCY and has been recently used in emergency dredging of a navigation channel for the Los Angeles River.

F. **Long Beach Main Channel Pit** - This pit is located just west of Pier J, and goes from -76 feet MLLW to about -90 feet MLLW in depth. It has a capacity of about 2.1 MCY.

G. **Energy Island North Pit** - This pit is located just north of Island White, and goes from about -30 feet MLLW to about -60 feet MLLW in depth. It has a capacity of about 7.2 MCY.

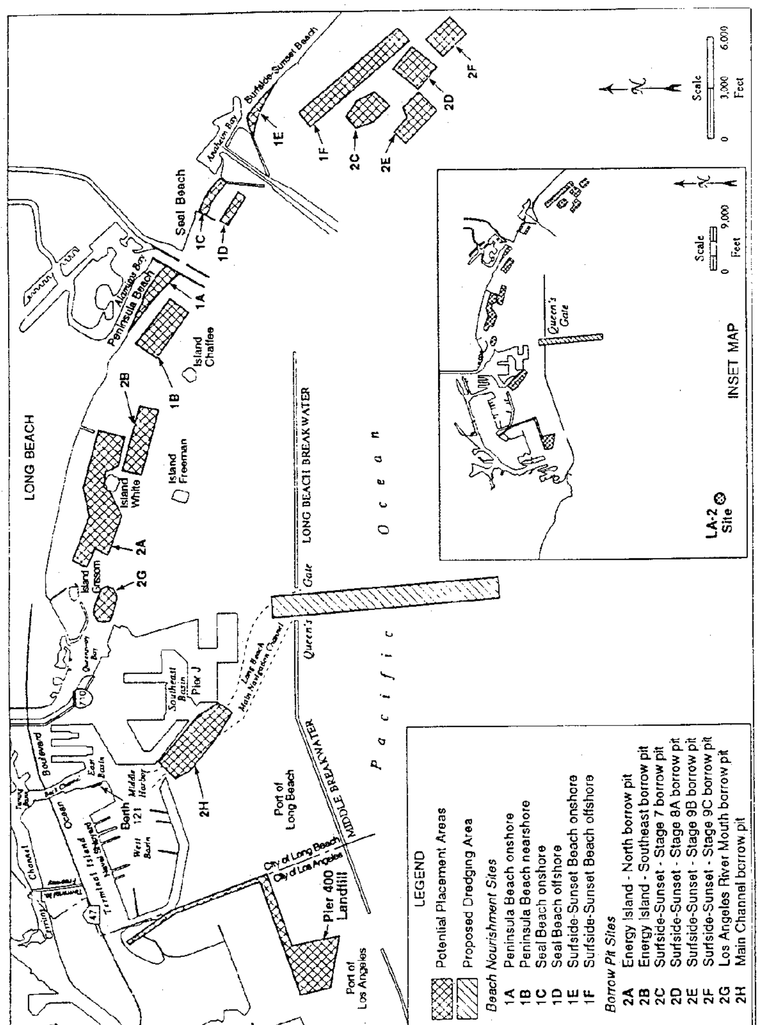
H. **Energy Island Southeast Pit** (SE of Island White) - This pit is located just southeast of Island White, and goes from about -30 feet MLLW to about -60 feet MLLW in depth. It has a capacity of about 1.6 MCY.

IV. **Other Acceptable Sites.** EPA has approved several ocean disposal sites in the general vicinity of the project area which is an option that would result in no beneficial use of the material. However, it is an option should the material be found to be unsuitable for any of the beneficial uses described above.

I. **L.A. 2** - LA-2 is an EPA-designated ocean disposal site for dredged material. The site was officially designated for dredged material in 1991. LA-2 is located near the edge of the continental shelf, 7.7 miles south of the San Pedro Breakwater. The area of the site is approximately 2.38 square miles, and the water depth varies from 387 to 1,050 feet. The capacity is assumed to be 6 MCY.

J. **Other Potential Sites** - It is noted that there could be a potential for using the dredged material for other projects that are developed and approved prior to dredging of the navigation channels. If such projects developed, it is expected that they would be coordinated with the Port of Long Beach and the Corps of Engineers to arrange for use of the material. This will require the project interests to obtain any required environmental and real estate approvals as well as willingness to pay for any additional costs for disposal above the determined Federal and non- Federal project cost.

Figure IV-3 Location of Preliminary Alternative Placement Sites.



Although no single site is large enough for the maximum dredge volume, the combined capacity of all the pits in the area exceeds 12.7 MCY, the estimated total dredge volume for "Pre-Pier J" conditions.

Preliminary Evaluation of Disposal Options.

The initial evaluation of the disposal options examined the compatibility of the dredged material with the desired beneficial use as well as preliminiary estimates of the cost of using each site.

Suitability for Beach Nourishment. Table IV-6, below, summarizes the grain size characteristics of the dredge material and primary placement sites. For more detailed information, see the Geotechnical Appendix.

Table IV-6 Summary of Grain Sizes at Dredge and Placement Sites

SITE	Description	D^{50}	Pct. Fines
DREDGE - sand	silty sand	.1	8 to 39
DREDGE - silt	fine silts	Less than .001	30 to 100
PLACEMENT - SE Energy Island	silts	.003	99
PLACEMENT - N Energy Island	silts	.004	97
PLACEMENT - LA-2	silty sand	.04	45 to 80
PLACEMENT - nearshore	silty sand	.06	26 to 74
PLACEMENT - onshore	sand	.24	1 to 28

Careful consideration was given to the suitability of the material for beach nourishment purposes, which is a beneficial use highly desired by the City of Long Beach and other interests. However, based on the results of the material testing program and design criteria for the material to be acceptable for beach nourishment, it was concluded that little, if any, benefit can be expected in using the material for beach nourishment either by onshore or nearshore placement. The reasons for this conclusion are as follows:

a. Onshore Placement. The results of the material testing indicate that about 1.8 to 2.1 million cubic yards of the material to be dredged consists of fine grained sand (0.1 mm) with significant proportions of silts and clays. The criteria developed jointly by the EPA and the Los Angeles District Corps of Engineers for beach compatibility of dredge material is that the material be clean and grain size compatible, i.e. the grain size distribution fall within the envelope of grain sizes of the beach and the percent of silts and clays not exceed that of the receiving beach by more than 10 percent. For the material to be compatible with the beaches along Alamitos Bay peninsula, the diameters should be between 0.15 and 2.0 mm or somewhat coarser. A preliminary estimate of the additional cost for placing the material on the beach is about $1 to $1.5 million. If the material was placed on the beach, it can be expected that 25 to 50 percent of the material could be lost during dredging and placement operations, resulting in about 2 to 3 million cubic yards to be actually placed for beach restoration. The placement of the finer material to restore beaches will change the characteristics of the beach and be aesthetically unacceptable as the silt and clay fractions typically settle on the surface of hydraulically placed fill. Fills containing fines exposed to the swash zone are also likely to erode rapidly under wave action, causing a persistent adverse turbidity impact. Consequently, any benefit from restoration of beaches using this material will be temporary, and adverse impacts may include turbidity along the shore.

b. Nearshore Berm. The construction of a nearshore berm is another technique that may have some merits in providing shore protection and beach nourishment to coastal areas. This concept involves placing material in the nearshore area as shallow and close to the shore as equipment allows (generally between -30 feet and -10 feet, MLLW) to build a wide mound to elevations of -10 to -15 feet, MLLW. Under gentle swell condition, sand from the mound is expected to migrate shoreward providing nourishment and restoring adjacent beaches. The mound is also expected to cause large storm waves to break further offshore which provides for greater dissipation of wave energy and should reduce erosion and storm damage potential. At this time, the Corps has not utilized this technique for shore protection, however, several demonstration projects have been performed using dredged material from navigation and other channel dredging projects that qualitatively suggest some beach nourishment benefits. For this technique, it is desirable for the site to be exposed to ocean swell and that the placed materials contain a high proportion of beach compatible grain sizes. The placement of fine sand such as the material from the Port of Long Beach channel deepening to build the mound is expected to realize similar losses as beach placement with respect to actual volumes placed to create the mound and could cost an additional $500,000 to $1 million. The construction of a mound with the Port of Long Beach channel deepening material within the sheltered wave climate of San Pedro Bay would likely create a relatively stable feature which would have minimum or no beach nourishment or wave energy dissipation benefit, since it would be rare for wave conditions to be extreme enough for the mound to effect wave breaking. On such high wave occasions, the mound would likely experience significant erosion. Similar to the beach placement option, there will be turbidity impacts, but it is expected that these would be less persistent and after initial placement only occur with higher than normal wave conditions. A large area of shallow water, benthic habitat would be covered causing temporary adverse biological impacts. Consequently, any benefit from placement of the material to construct a nearshore berm is likely to be minor and infrequent.

c. Nearshore Placement. Test results show the fine sand to be dredged from the channel deepening plan is compatible with nearshore bottom material seaward of the Alamitos Bay ocean beaches. Another option considered for beach nourishment use of the dredged material involves spreading the material in the nearshore to raise bottom elevations two to four feet depending on the length and width of the placement area. A preliminary estimate of the additional costs for this type of placement would be between $500,000 and $1 million. The change in offshore bathymetry and nearshore profiles caused by raising the nearshore bathymetry two to four feet in depths of- 30 to -15 feet, MLLW would not cause any significant change in the wave climate in the surf zone area where most erosion and storm damage potential occurs. Consequently, this option is not expected to have any significant benefits to reducing erosion or restoring protective beaches, while it would add considerable cost and adverse impacts to a wide spread area of the shallow water benthic environment.

Pit Disposal. The dredge material is considered compatible for pit disposal since the grain sizes are similar or coarser to sizes present in the pits.

Sediment Chemistry Compatibility

To assess chemistry compatibility, sediment quality was assessed for the proposed dredge-area and receiver sites sediments with respect to reference sites and California Clean Coast data compiled by the Southern California Coastal Water Research Project (SCCWRP). In addition, site-specific comparisons of organic contaminants and metals were made between sediments at the dredge area and potential receiver sites.

Based on discussions with EPA and other agency interests, it was generally agreed that if the material is relatively free of contaminants as compared to the reference sites and the dredge area sediments are cleaner than placement site sediments, then dredge material can be placed in the receiver sites without additional testing.

As shown in Tables IV-7 and IV-8, in general, the dredge area sediments are much cleaner than both the Energy Island Pits and LA-2. It can also be seen that the Energy Island Pits have in general a higher level of contaminants, both organic and heavy metals, than that found at LA-2. Therefore, the dredge sediments are chemically compatible with the Energy Island Pits and LA-2. With the possible exception of onshore and nearshore placement, the dredge material was found to be suitable for placement at all sites considered. Chemical compatibility with the onshore and nearshore zones was not assessed further because those sites are eliminated for other reasons.

Table IV-7 SUMMARY OF ORGANIC TESTING RESULTS FOR SEDIMENTS AT THE DREDGE AREA, ISLAND WHITE, AND THE LA-2 OFFSHORE PLACEMENT SITE

	DREDGE AREA		ISLAND WHITE		LA-2	
	Range	Average	Range	Average	Range	Average
Total Organic Carbon (TOC) (%)	0.1-2.87	0.25-0.75	1.55-2.06	1.81	1.07-1.22	1.15
Total Polycyclic Aromatic Hydrocarbon (PAH) (µg/kg)	21-46 [b]	39	156-255	206	251-295	273
Total Phthalates (µg/kg)	21-590	25-75	552-1900	1226	152-214	183
Total Phenols (µg/kg)	NA	35 [a]	NA	ND	NA	50 [a]
Total Recoverable Petroleum Hydrocarbon (TRPH) (mg/kg)	11-93	10-60	710-1200	955	232-236	234
Butyltins (µg/kg)						
Monobutyltin (MBT)	NA	ND	3-7	5	NA	ND
Dibutyltin (DBT)	1-7	4	12-17	14.5	1-5	3
Tributyltin (TBT)	1-12	6.5	20-23	21.5	6-8	7
4,4'-DDE (Dichlorodiphenyl Dichloroethylene) (mg/kg)	0.02-0.1	0.02-0.05	NA	0.03	0.03-0.05	0.04
Total Polychlorinated Biphenyl (PCBs) (mg/kg)	0.01-0.02	0.01	0.1-0.17	0.135	0.04-0.05	0.045

Notes: a. Detected in one sample.
b. Detected in four samples.
NA = Not applicable.
ND = Not detected.

Source: Sea Surveyor, Inc. 1994.

77

Table IV-8 SUMMARY OF METAL TESTING RESULTS FOR SEDIMENTS AT THE DREDGE AREA, ISLAND WHITE, AND THE LA-2 OFFSHORE PLACEMENT SITE

	DREDGE AREA		ISLAND WHITE		LA-2	
Metal	Range	Average	Range	Average	Range	Average
Arsenic	0.9-19.2	1-6	10.3-11.2	10.8	7.9-9.5	8.7
Cadmium	0.03-0.26	0.03-0.16	0.91-1.52	1.22	0.48-0.56	0.52
Chromium	6.7-42.1	11-25	46.5-47.9	47.2	32.1-37.6	34.9
Copper	4.34-41.9	5-20	60-66.1	63.05	33.5-39.1	36.3
Lead	1.81-16.6	3-9	118-144	131	43.4-46.1	44.75
Mercury	0.02-0.17	0.02-0.06	NA	0.24 [a]	0.17-0.19	0.18
Nickel	5.3-29.7	6-17	31.7-34.7	33	20.5-24.2	22.4
Selenium	0.05-0.06 [b]	0.05	0.09-1.2	1.05	NA	ND
Silver	0.02-0.17	0.02-0.07	0.37-0.41	0.39	0.25-0.3	0.28
Zinc	20.7-90.9	25-55	190-220	205	94.1-123	108.6

Notes: a. Detected in one sample.
b. Detected in four samples.
NA = Not applicable.
ND = Not detected.

Source: Sea Surveyor, Inc. 1994.

78

Comparative Dredging Costs

Table IV-9 shows the preliminary estimate of dredging unit costs and any additional GNF costs for each alternative site evaluated. These costs were developed using the Corps' Dredge Estimating Program and are supported by the Cost Estimating appendix.

TABLE IV-9. Preliminary Dredging Costs

Site	Cost per C.Y.
Pier 400	2.15*
Main Channel Pit	2.05
Energy Island N. Pit	2.15
Energy Island SE Pit	2.12
LA-2	3.30
Surfside/Seal Onshore	3.20
Surfside/Seal Nearshore	2.70
Peninsula Onshore	3.00
Peninsula Nearshore	2.60
Upland	20.00 **
L. A. River Pit	2.15
Pier J actual cost***	2.70

* Since the Port of Los Angeles is expected to be operating equipment to place the needed material under without project conditions, it is expected that there would be no additional cost to place material from Port of Long Beach dredging.

** Depends on site distance and any special requirements. $20/cy is a minimal cost.

*** This is the unit dredging cost incurred by the Port for dredging the channel inside the breakwater and placing it behind dikes to create Pier J expansion. It does not include any diking or associated costs or mitigation. Mitigation adds about $40,000 per Acre.

Selection of Final Alternative Disposal Sites

Table IV-10 shows the evaluation and comparison of the various placement sites and the no-action alternative. The evaluation considered the potenitial cost, beneficial uses of the material based on geotechnical and chemical compability of the dredged material, potential environmental impacts, and agency interests. The alternative sites are listed and briefly described below, along with the reasons for carrying them forward or eliminating from further consideration. Pier J disposal was not carried forward into this analysis because it has a significantly higher unit dredging cost and additional landfill mitigation costs associated with it.

A. **Peninsula Beach/5th to 18th St.** (Long Beach) Nearshore/Onshore - The dredged material is unsuitable for onshore placement due to grain size incompatibility. In addition it is not expected that there would be any significant beach nourishment benefit from placing the material in the near shore. The potential for turbidity and other environmental impacts, and additional construction cost are considered undesirable and therefore this option is not carried forward in developing the final alternatives.

B. **Surfside/Sunset/Seal Beach Nearshore/Onshore** - Based on the fine grain characteristics of the dredged material, it is not expected to contribute to beneficial uses for beach nourishment either by onshore or nearshore placement. In addition, potential turbidity and other environmental impacts, and higher costs due to the further distance to site make this option undesirable and was not carried forward.

C. **Port of L.A. - Pier 400** - The POLA has reviewed the geotechnical and chemical characteristics of the dredge material and is interested in obtaining the material classified as silty-sand, approximately 2.0 mcy of material. The dredged material will be placed by hopper into the approved channel area in the POLA, then if necessary, bypassed by an electric hydraulic pipeline dredge into the approved Pier 400 landfill. Placement activities will comply with the approved permit for the Pier 400 project that is currently under construction. If used, any costs above NED plan would be paid by Port of L.A., and any additional environmental documentation and permits would be responsibility of POLA. In view of the beneficial use of the material and reasonable cost, this option is carried forward in developing final alternatives.

D. **Upland disposal** - Volume is too great for one site and cost would be substantially higher than other options due to cost of de-watering, double handling, and trucking to multiple upland sites. Significant Air Quality impacts could also result from this operation. Option is not desired and is not carried forward.

E. **L.B. Main Channel Pit** - Low cost, and material is compatible. There is a potential benefial use for ecological restoration, and is supported by the Port of Long Beach. Therefore, this site is carried forward in developing final alternatives.

F. **Energy Island North Pit** (N. of Island White) - This site also has a low cost, with potential for beneficial ecological benefits. The dredged material is compatible with this site and there appears to be no opposition for using this site as a disposal area. However, there is some interest in reserving this pit for possible future disposal requirements. Option is carried forward as part of developing final alternatives.

G. **Energy Island Southeast Pit** (SE of Island White) - This site also has low cost and potential for some ecological benefits. Material is compatible and there appears to be no opposition for using this site. Option is carried forward into final array.

H. **Pit at Mouth of L.A. River** (Queensway Bay Pit) - This pit has been recently used for emergency dredge activities from Golden Shores landing entrance near the Los Angeles river mouth. In 1995, approximately 600,000 cy of material were placed in this pit associated with an emergency action. Therefore, this pit will not be used, but will be saved for future dredge material disposal associated with the Golden Shores Landing Entrance near the Los Angeles river mouth.

I. **L.A. 2** - The site is in the process of being recertified by the EPA. Because the dredge materials are suitable, both physically and chemically, it is assumed that all of the dredged material could be placed at this site. Although there is no beneficial use of the material and costs are higher, this site was carried forward into developing final plans since it is an approved designated disposal site and in case further studies indicate the other options are not acceptable.

In summary, the final sites carried forward in developing the final alternative plans include Pier 400, Main Channel Pit, both Energy Island Pits, and LA-2. These sites are shown on Figure IV-4.

Table IV-10 Comparison of Potential Alternative Placement Sites.

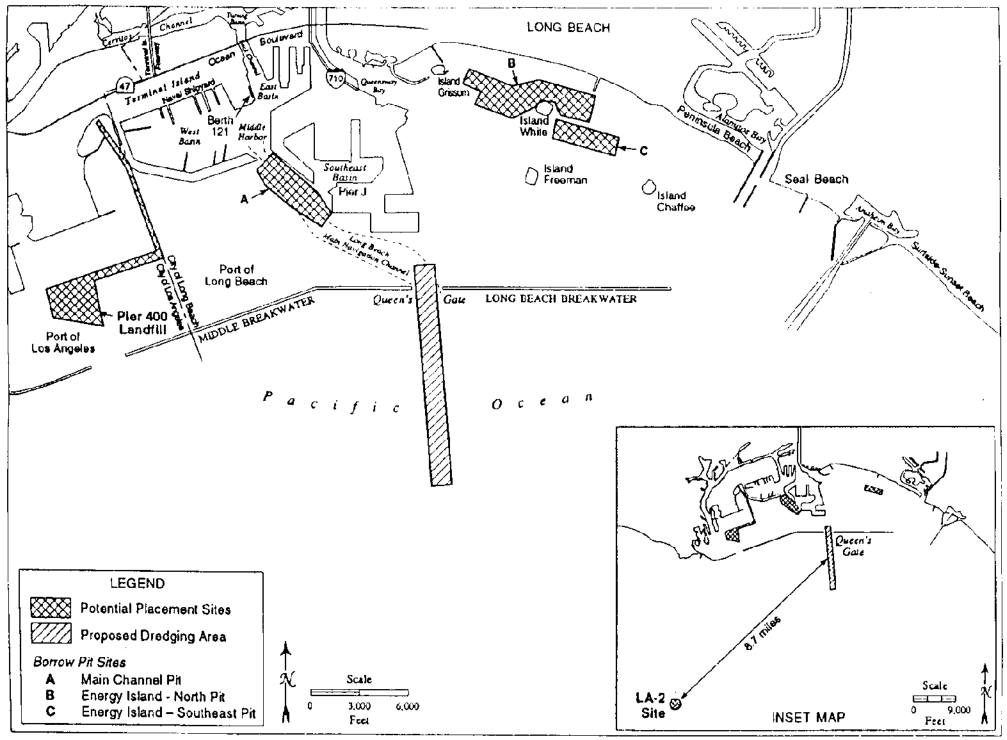
PRELIMINARY COMPARISON OF POTENTIAL PLACEMENT OPTIONS AND THE NO-ACTION ALTERNATIVE

Site	Sufficient Capacity	Economic Ranking[1]	ENVIRONMENTAL CONSIDERATIONS					Support Level[2]	Final Alternatives
			Geo	Chem	Bio	Beneficial Use	AQ		
POLA Pier 400	No	1	0(+)	0	0	+	-S	High	Yes
Pits	Yes	1	0(+)	+	+	+	-S	High	Yes
LA-2	NK	4	0	0	0	-	-S	Medium	Maybe
Onshore	Yes	3	-S	0	-S	0	-S	High	No
Nearshore	Yes	2	0	0	-S	0	-S	High	No
Upland	No	5	NE	NE	NE	-	--S	None	No
No-Action	NA	6	0	0	0	-L	-L	None	Yes[a]

Abbreviations:
+ = Positive Impact
- = Negative Impact
0 = Neutral/Questionable Impact
S = Short-term Impact
L = Long-term Impact
NE = Not evaluated
NA = Not applicable
NK = Not known at this time

1 "Economic Ranking" is the relative cost associated with each potential placement site. POLA Pier 400 and the borrow pits would have the lowest and very comparable costs, so both options are assigned a "1" for economic ranking.
2 "Support Level" is the level of support or interest in the placement option by affected agencies.

Figure IV-4 Location of Final Alternative Placement Sites



DEVELOPMENT OF FINAL ALTERNATIVE PLANS

The development of the final alternative plans to meet the established planning objectives is based on further consideration of the designed channel requirements and selected disposal options generated in the previous sections. The development of the final plans includes: (1) further analysis of the channel depth to define the navigation improvement dimensions associated with meeting the intent of optimizing the first planning objective; and (2) based on dredge volume requirement associated with the optimum channel, further analysis of the disposal options to develop a final array of plans that further addresses the planning objectives and other criteria.

Optimization of Channel Depths

In accordance with Corps of Engineers planning guidance for deep draft navigation improvements, the optimization of channel depths involves analyzing the cost and benefits of alternative channel designs and disposal options to determine the plan which maximizes the Net Economic Development Benefits to the Nation. The total cost of the alternative plans includes all costs necessary for implementing the project including dredging and disposal of material; any real estate requirements and additional requirements such as diking or relocation of utilities; requirements for mitigation of impacts; and associated items required for the project such as berth and wharf modifications or terminal facilities required to realize the benefits of the project. In general, the benefits of deep draft navigation plans is associated with transportation savings in moving commerce.

Dredging Completed By POLB

In accordance with Section 4 of the 1988 Water Resources Development Act and the Port of Long Beach's desire to receive credit for partial dredging they completed of any Federal navigation improvements that may result from this study, the optimization of the navigation improvements must consider total cost of required general navigation features assuming the Federal Government had performed the work. This requires consideration of conditions prior to the work completed by the Port of Long Beach including Pre-Pier J project bathymmetry, and also requires consideration of all viable disposal options. It is noted that the actual cost to the Port of Long Beach in completing the channel dredging included costs for diking to create landfill, and mitigation associated with the landfill. Consequently, the actual cost of the general navigation features was considerably higher than the options for disposal selected above. For the purposes of optimization and determination of credit, the most cost-effective disposal option is assumed in this analysis.

<u>**Optimization Approach**</u>

The approach taken to optimize the channel depths for the Port of Long Beach is based on the following considerations:

1. Dredging requirements are based on Pre-Pier J conditions, and will include dredging needed to provide the designed alternative channel dimensions for the main channel and turning basin, as well as the approach and entrance channels.

2. A single disposal plan using the cost for placing the material in the energy island pits will be used for optimizing channel dimensions.

The latter consideration is considered acceptable approach based on the following reasons:

- The cost for dredging and disposal at the final alternative disposal sites selected in the previous Section are essentially the same, except for the LA-2 site which is considerably higher and would therefore not be the least costly plan associated with the optimum plan.

- Any additional cost required by the Port of Los Angeles for placement of material in Pier 400 would be paid for by the Port of Los Angeles. There is no increase NED cost for this option above the cost of the pit disposal options.

- There is adequate total volume available in the final selected disposal site options to accommodate disposal of all dredged material including dredging completed by the Port of Long Beach.

- There is no mitigation costs associated with any of the selected disposal options that would increase the cost of one site over another site.

- There are no additional NED benefits associated with any of the disposal options that would impact on optimization.

Based on the above, the optimization of the channel dimensions includes the development of alternative plan costs and benefits, and an economic analyisis to determine depth at which the net National Economic Development Benefits are maximized.

Project Cost Estimates

<u>**Construction Methods**</u>

Pier 400 Placement

For placement at Pier 400, a hopper dredge would be used and the material dumped into an approved channel area in the Port of Los Angeles. Concurrent Federally authorized dredging operations at the Port of Los Angeles will be creating new channels and landfill for Pier 400 using an electric hydraulic pipeline dredge. Placement of the Long Beach material in front of this dredge will allow it to be bypassed into the landfill area by pipeline through this dredge.

Long Beach Main Channel Pit

For disposal in the Main Channel Pit, a hopper dredge would be used almost exclusively and the material would be bottom-dumped directly into the pit. Cutter-suction pipeline dredges were considered but rejected for two main reasons. First, they are not very suitable for open ocean operations outside the breakwater due to the effects of wave action on the pumpout pipeline and connections. Second, they are not easily moved, and would have a greater impact on vessel traffic at both the dredge and discharge areas.

Energy Island Pit Placement

For disposal in the Energy Island pits, a hopper dredge would be used almost exclusively and the material would be bottom-dumped directly into the pits. Cutter-suction pipeline dredges were considered but rejected for the same reasons indicated in the previous paragraph plus the fact that the pumping distance to the pits would significantly increase the dredging cost.

LA-2 Placement

For placement at LA-2, a hopper dredge would be used almost exclusively, and the material would be bottom dumped over the LA-2 site. Cutter suction pipeline dredging is not feasible for this distance to the placement site.

General Navigation Features

The following provides cost estimates for dredging and disposal of constructing the alternative designed channels. Details are presented in the Cost Estimates Appendix. The cost estimates are based on October 1995 Price Levels. The unit dredging costs are based on recent bids for similar work in both Los Angeles and Long Beach Harbors, interviews with local dredging contracting firms, and analyses using the Corps of Engineers Dredge Estimating Program.

The cost estimates include contingencies for each cost item based on an analysis of the accuracy of information used for the design and costs. The cost estimate also includes the estimated cost for mobilization and demobilization of equipment, Engineering and Design, and Supervision and Administration of construction.

Mobilization & Demobilization. Costs for Mobilization and Demobilization included hopper dredge and associated equipment, and a survey vessel and associated equipment.

Real Estate Aquisition. Channel and disposal lands are within the jurisdiction of the Port of Long Beach, the City of Long Beach, and the State Lands Commission. There are no direct costs for real estate aquisition or changes in value associated with the plans. However, about 2 acres would be required for a staging area associated with dredging the remaining channel. The staging area is expected to be located at the end of the Navy mole, which will be arranged by the Port of Long Beach. It is noted that for the total plan it is assumed about 4 acres would be needed for additional equipment or to reflect the additional time required to dredge inside and outside the breakwater.

Engineering & Design. Engineering and Design (E&D) includes both Pre-construction (Planning, Engineering and Design Phase of Project Development) and during construction, and includes both channel and disposal area design.

Supervision and Administration (S&A). S&A costs were estimated based on approved rates established for construction management.

Aids to Navigation. The costs for aids to navigation are based on information from the U.S. Coast Guard presented in Appendix A.

Associated Costs

Associated Costs were defined as those costs necessary for implementation of the plan and realization of the benefits, but not part of the GNF. The only associated costs are for some additional landside tank storage (see Port Facilities, below), and these costs were provided to the Port by Arco Terminal Services, the owner of the tanks.

Port Facilities

The only port facilities that may be required to realize the project benefits are some additional landside tank storage. Storage capacity of 1.4 million barrels presently exists for unloading vessels. These tanks are located on Pier E adjacent to Berth 121 and at existing storage facilities in the City of Carson (Figure IV-5). The existing capacity is adequate to unload vessels delivering about 200,000 Metric Tons of crude. Accordinglyly, Table IV -11 shows the additional storage and costs for providing the storage that would be necessary for vessels bringing in crude deliveries greater than the existing capacity. These would be built on land owned by Arco Terminal Services and made available to the users of Berth 121. These costs have E&D and S&A built-in, and are included, as applicable to the costs for alternative channel depths depending on design vessel and delivery volumes. Consequently, these costs do not increase smoothly with channel depth, but reflect incremental jumps at certain depths. This is because storage tanks are generally built to a standard volume of about 250,000 to 500,000 barrels, and when one tank reaches capacity, another tank is required, even if the vessel offloading needs are less than the total tank capacity.

Figure IV-5 Location of Landside Tanks and Pipelines

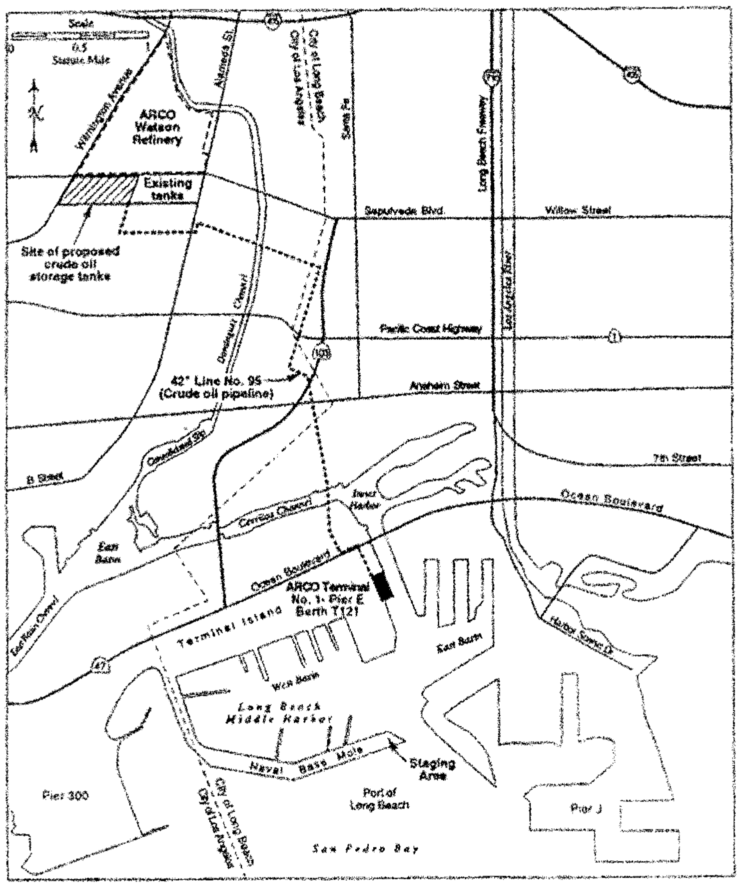


Table IV-11. ASSOCIATED COSTS FOR TANK STORAGE

CHANNEL DEPTH (FT MLLW)	DEPTH WITH TIDE (FT MLLW)	OPERATING VESSEL (1,000 DWT)	VESSEL DELIVERY (1,000 MT)	TOTAL BARRELS (1,000 BBL)	ADDED CAPACITY NEEDED (1,000 BBL)	ADDED TANK CAPACITY (1,000 BBL)	TOTAL COST ($1,000)
69	72	265	226	1,626	226	250	5,750
70	73	300	247	1,777	377	500	10,500
71	74	300	252	1,813	413	500	10,500
72	75	300	257	1,849	449	500	10,500
73	76	325	275	1,978	578	750	15,250
74	77	325	280	2,014	614	750	15,250
75	78	365	304	2,187	787	1,000	20,000
76	79	365	310	2,230	830	1,000	20,000
77	80	365	315	2,266	866	1,000	20,000
78	81	365	315	2,266	866	1,000	20,000

(a) 7.19425 Bbl/MT
(b) Cost include $1 million for additional piping.

First Costs

Tables IV-12, IV-13, and IV-14, show the total first cost for the completed and uncompleted portions with least cost disposal; uncompleted portion only by depth which includes the costs required to complete channel dredging based on existing conditions with least costly disposal; and uncompleted portion based on existing conditions with disposal at LA-2. The costs are based on October 1995 price levels and include the cost of the general navigation features and associated costs.

Annual Costs

Annualized costs by incremental depths are also presented in Tables IV-12, IV-13, and IV-14. The annual costs are based on an interest rate of 7 3/4% and an economic life of 50 years. Annual costs include interest during construction, interest and amortization, and operation and maintenance.

Operations and Maintenance

Operations and maintenance is limited to the channel areas only. Historically, there has been very little sedimentation of channels in San Pedro Bay, and due to the depth of the channel and surrounding bathymmetry, there is very little movement of sediment in the project area. However, it is expected that periodic surveys will be required to ensure proper channel dimensions are maintained. However, as these surveys are presently required for the existing Federal navigation project channels, the cost can be considered negligible.

Details on the cost estimate are presented in Appendix C.

Table IV-12 First Cost and Annual Cost of Completed and Uncompleted Portions By Depth

FIRST COSTS ($1000)	60	63	66	69	70	71	72	73	74	75	76	77	78
GNF													
Mob & Demob	0	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520
Dredging	0	4,074	7,952	12,806	16,392	18,407	20,194	22,624	24,886	26,968	29,487	34,137	36,462
Deeper than 45'	0	2,817	5,400	9,577	13,001	14,793	16,415	18,626	20,668	22,455	24,681	29,037	30,913
Overdepth (2')	0	1,257	2,552	3,228	3,391	3,614	3,776	3,998	4,218	4,512	4,806	5,100	5,548
Mit. Disposal	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	4,074	7,952	12,806	16,392	18,407	20,194	22,624	24,886	26,968	29,487	34,137	36,462
LERRDS		120	120	120	120	120	120	120	120	120	120	120	120
ASSOC. COSTS ($1000)													
Berthing Area	0	0	0	0	0	0	0	0	0	0	0	22	44
Overdepth (2')	0	0	0	0	0	0	0	0	0	0	0	44	44
Tankage	0	0	0	5750	10500	10500	10500	15250	15250	20000	20000	20000	20000
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL ($1000)	0	0	0	5750	10500	10500	10500	15250	15250	20000	20000	20067	20089
AIDS to NAV. ($1000)	0	110	110	110	110	110	110	110	110	110	110	110	110
SUBTOTAL ($1000)	0	6,824	10,702	21,306	29,642	31,657	33,444	40,624	42,886	49,718	52,237	56,953	59,300
E & D ($1000)	0	409	635	926	1,141	1,262	1,369	1,515	1,651	1,776	1,927	2,210	2,351
S & A ($1000)	0	273	423	617	761	841	913	1,010	1,101	1,184	1,285	1,473	1,567
TOTAL FIRST COST	0	7,506	11,760	22,849	31,544	33,760	35,726	43,149	45,638	52,677	55,449	60,637	63,218
IDC	0	529	829	1,651	2,297	2,453	2,592	3,148	3,324	3,853	4,048	4,414	4,596
TOTAL COST ($1000)	0	8,035	12,590	24,500	33,841	36,214	38,318	46,298	48,961	56,530	59,497	65,051	67,814
INTEREST & AMOR.													
(7 3/4%, 50 yrs)	0	638	1,000	1,945	2,687	2,875	3,042	3,676	3,888	4,489	4,724	5,165	5,385
O & M													
(0.5% of Dikes)	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL ANNUAL COST	0	638	1,000	1,945	2,687	2,875	3,042	3,676	3,888	4,489	4,724	5,165	5,385

Table IV-13 First Costs and Annual Costs of Uncompleted Portion of Work With Least Costly Disposal by Depth

FIRST COSTS ($1000)	60	63	66	69	72	73	74	75	76	77	78
GNF											
Mob & Demob	0	1,080	1,080	1,080	1.080	1,080	1,080	1.080	1,080	1.080	1,080
Dredging	0	1.366	2.921	4,915	8.472	9.571	10.766	12,128	13.788	16.703	19.617
Deeper than 45'	0	871	1,111	2,429	5.436	7.057	7.290	9,100	10.467	12.345	14.811
Overdepth (2')	0	495	1.809	2.486	3.036	2.513	3.476	3,027	3.321	4.358	4.806
Mit. Disposal	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	1.366	2.921	4.915	8.472	9.571	10,766	12,128	13.788	16.703	19.617
LERRDS		60	60	60	60	60	60	60	60	60	60
ASSOC. COSTS ($1000)											
Berthing Area	0	0	0	0	0	0	0	0	0	22	44
Overdepth (2')	0	0	0	0	0	0	0	0	0	44	44
Tankage	0	0	0	5,750	10.500	15.250	15.250	20,000	20,000	20,000	20,000
Other	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL ($1000)	0	0	0	5750	10500	15250	15250	20000	20000	20067	20089
AIDS to NAV. ($1000)	0	110	110	110	110	110	110	110	110	110	110
SUBTOTAL ($1000)	0	2.616	4.171	11,915	20.222	26.071	27.266	33.378	35.038	38.019	40.956
E & D ($1000) INCL PED)		806	865	945	1.087	1.131	1.179	1.234	1.300	1.419	1.537
S & A ($1000)	0	165	259	385	609	678	753	839	950	1,131	1.316
TOTAL FIRST COST	0	3.587	5,295	13,245	21.918	27.880	29,199	35,450	37.288	40.570	43,809
IOC	0	203	323	923	1.567	2.020	2.113	2.587	2.715	2.946	3,174
TOTAL COST ($1000)	0	3.789	5.618	14.169	23.485	29,901	31.312	38,037	40,004	43.516	46,983
INTEREST & AMOR.											
(7 3/4%, 50 yrs)	0	301	446	1.125	1.865	2,374	2.486	3.020	3.176	3,455	3,730
O & M											
(0.5% of Dikes)	0	0	0	0	0	0	0	0	0	0	0
TOTAL ANNUAL COST	0	301	446	1.125	1.865	2.374	2.486	3.020	3.176	3.455	3.730

Table IV-14 First Costs and Annual Costs of Uncompleted Portion Work With Disposal at LA-2 by Depth

FIRST COSTS ($1000)	60	63	66	69	72	73	74	75	76	77	78
GNF											
Mob & Demob	0	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Dredging	0	2,004	4,283	7,209	12,425	14,037	15,791	17,787	20,223	24,497	28,771
Deeper than 45'	0	1,278	1,630	3,563	7,973	10,351	10,693	13,347	15,352	18,106	21,723
Overdepth (2')	0	726	2,654	3,646	4,453	3,686	5,098	4,440	4,871	6,391	7,049
Mit. Disposal	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	2,004	4,283	7,209	12,425	14,037	15,790	17,787	20,223	24,497	28,771
LERRDS		60	60	60	60	60	60	60	60	60	60
ASSOC. COSTS ($1000)											
Berthing Area	0	0	0	0	0	0	0	0	0	33	65
Overdepth (2')	0	0	0	0	0	0	0	0	0	65	65
Tankage	0	0	0	5,750	10,500	15,250	15,250	20,000	20,000	20,000	20,000
Other	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL ($1000)	0	0	0	5759	10500	15250	15250	20000	20000	20098	20130
AIDS to NAV. ($1000)	0	110	110	110	110	110	110	110	110	110	110
SUBTOTAL ($1000)	0	3,254	5,533	14,209	24,175	30,537	32,291	39,037	41,473	45,845	50,152
E & D ($1000) (INCL PED)		430	519	636	845	909	979	1,059	1,157	1,331	1,504
S & A ($1000)	0	205	345	529	858	959	1,070	1,196	950	1,624	1,896
TOTAL FIRST COST	0	3,889	6,397	15,374	25,878	32,406	34,339	41,292	43,579	48,800	53,551
IDC	0	252	429	1,101	1,874	2,367	2,503	3,025	3,214	3,553	3,887
TOTAL COST ($1000)	0	4,141	6,826	16,476	27,751	34,772	36,842	44,317	46,793	52,353	57,438
INTEREST & AMOR. (7 3/4%, 50 yrs)	0	329	542	1,308	2,203	2,761	2,925	3,519	3,715	4,157	4,561
O & M (0.5% of Dikes)	0	0	0	0	0	0	0	0	0	0	0
TOTAL ANNUAL COST	0	329	542	1,308	2,203	2,761	2,925	3,519	3,715	4,157	4,561

PROJECT BENEFITS

The navigation benefits that would result from deepening the channel are associated with savings in transportation costs by allowing the large crude tankers on the Persian Gulf, Far East, and Alaska Trade Routes to enter the port in a more fully loaded condition. In addition, more efficient deeper draft vessels may be used on these trade routes. Cargo volumes by trade route are the same as without project conditions.

Projected Cargo

The cargo projected to benefit from deepening the channel to Berth 121 is given in Table IV-15 and was previously discussed in Chapter III and in detail in the Economic Appendix. The projections are the same for with and without project conditions.

TABLE IV-15 PROJECT CRUDE PETROLEUM IMPORTS 1990-2050 BERTH 121, BY TRADE ROUTE, ASSUMING NO DEVELOPMENT OF ANWR PETROLEUM RESOURCES

	Imports (1,000's metric tons)						
Trade Route	1990	2000	2010	2020	2030	2040	2050
Far East and SE Asia	1,224	2,028	1,760	2,174	2,174	1,840	1,840
Alaska	12,857	8,465	5,152	3,169	1,836	1,470	1,470
Persian Gulf	7	3,200	5,800	7,200	7,400	8,000	8,000
Total	14,088	13,693	12,712	12,543	11,410	11,310	11,310

Projected Fleet

The transportation cost analysis is based on a future fleet profile generated by considering port limiting depths and using the optimum vessel for each trade route. This approach limited the fleet to the shallower available port drafts, either shipping or receiving. For some trade routes, deepening at Long Beach allows vessels to load deeper until they hit the foreign port depth limits. For others, foreign port depths exceed depths considered for POLB, and so the vessels are constrained only at POLB. This is discussed in detail in the Economics Appendix.

Transportation Cost Savings

The benefits were derived by computing transportation costs under without project conditions and comparing them to transportation costs with channel improvements. The transportation cost savings were not dependent on placement method, but were estimated for a range of channel depths in one foot increments. For each depth analyzed the most efficient vessel fleet available considering foreign port constraints was selected by decade based on the cost per ton analysis for that trade route. Transportation costs were then derived based on using the most efficient fleet available to move the cargo projected to move on that trade route by decade. The use of tides as described previously was also assumed.

Table IV-16 shows the equivalent average annual transportation cost of crude for different channel depths and also computes the transportation savings at each depth compared to the without project transportation costs.

Table IV-16 Avg. Annual Transporation Costs and Savings by Depth and Decade ($1,000)

CRUDE ANNUALIZATION, WEFA FORECAST

7.750%
50

Depth	60	67	68	69	70	71	72	73	74	75	76	77
2000	138,333	117,772	115,710	113,735	112,101	111,243	110,734	110,239	109,789	109,394	109,064	109,064
2010	170,646	148,652	146,024	143,505	141,726	140,065	139,129	138,442	137,589	136,974	136,278	136,278
2020	185,129	161,693	158,916	156,255	154,279	152,218	151,056	150,203	149,145	148,381	147,517	147,517
2030	177,724	155,391	152,756	150,230	148,305	146,191	145,001	144,127	143,042	142,258	141,369	141,369
2040	181,062	157,979	155,247	152,628	150,614	148,363	147,109	146,183	145,034	144,191	143,230	143,230
2050	181,062	157,979	155,247	152,628	150,614	148,363	147,109	146,183	145,034	144,191	143,230	143,230
PRES. VALUE	2,134,837	1,855,245	1,822,986	1,792,073	1,768,946	1,747,494	1,735,350	1,726,128	1,715,097	1,706,948	1,698,005	1,698,005
EQ. ANNUAL	$169,508	$147,308	$144,747	$142,292	$140,456	$138,753	$137,788	$137,056	$136,180	$135,533	$134,823	$134,823
SAVINGS		$22,200	$24,761	$27,216	$29,052	$30,755	$31,720	$32,452	$33,328	$33,975	$34,685	$34,685

Economic Analysis

An economic analysis of the Total Plan costs and benefits at various incremental depths was conducted by comparing the cost for implementation with expected benefits of the plan on an annual basis. This determines the optimized NED depth based on maximizing net NED Benefits. The costs used in this analysis include the volume of dredging done by the POLB inside the breakwater assuming Pre-Pier J expansion conditions, and the least costly disposal method. This analysis allows selecting the optimized depth of the channel improvements that the Corps of Engineers would have chosen for the Total NED Plan prior to the work completed by POLB. Therefore, it establishes a basis for determining the Federal cost of the Total NED Plan, and any credit that POLB would be eligible for with respect to the Federal share of the work they completed on the Total NED Plan.

Table IV-17 displays the annualized construction costs and transportation savings for the range of channel depths, and computes net NED benefits. This table shows that deepening to -76 feet MLLW maximizes the NED benefits.

Table IV-17 NED Depth Optimization

POLB ECONOMIC ANALYSIS
NED DEPTH OPTIMIZATION
INCLUDES COSTS OF PORTS ADVANCE DREDGING (completed portion)

VOLUME Crude (80%)
31-May-95
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($1,000)	60	63	69	70	71	72	73	74	75	76	77	78
COSTS												
First Cost	0	7,506	22,849	31,544	33,760	35,726	43,149	45,638	52,677	55,449	60,637	63,218
Total Annual Cost	0	638	1,945	2,687	2,875	3,042	3,676	3,888	4,489	4,724	5,185	5,385
Transportation Cost	169,508	156,835	142,292	140,456	138,753	137,788	137,056	136,180	135,533	134,823	134,823	134,823
BENEFITS												
Transportation Savi	0	12,673	27,216	29,052	30,755	31,720	32,452	33,328	33,975	34,685	34,685	34,685
W/O Location Benefits												
NET BENEFITS	0	12,035	25,270	26,365	27,880	28,677	28,776	29,440	29,486	29,961	29,520	29,300
B/C Ratio	0	19.86	13.99	10.81	10.70	10.43	8.83	8.57	7.57	7.34	6.72	6.[illegible]

Interest Rate: 7.750%
Project Life: 50 years

Final Array of Alternatives

The development of the final alternatives recognizes the optimized channel depth and associated dredging requirements, and the beneficial uses, costs, and environmental considerations associated with the most viable material disposal options selected in the previous section. The specific advantages and disadvantages of each site are described below:

1. **Pier 400.** Pier 400 placement would provide the most beneficial use of the dredged material as compared to the final disposal options, based on the economic benefits resulting from the landfill and reduction of impacts at the borrow site that would have been used for the landfill in place of the POLB dredged material. The cost of placing the material in the landfill is considered essentially the same as the cost of placing the material in the Energy Island pits. Depending on final location of the material, there may be some additional operation for final placement of the material that will be paid by the Port of Los Angeles. However, it is expected that this additional cost would not be greater than the cost for an eqivalent volume of material required under without project condition. The placement of the material to create Pier 400 and associated environmental impacts and mitigation requirements have been addressed in the approved permit for Pier 400 construction, presently underway, and associated EIR/EIS.

2. **Main Channel Pit.** The Main Channel Pit is the least costly of the final disposal options due to its closeness to the dredged area. Placement in the Main Channel Pit from its present depth (-90 to -95' MLLW) to the surrounding depth (-76 to -80' MLLW) would have some ecological beneficial use based on increase circulation and dissolved oxygen in the area which could result in some increase bio-productivity. It is far from shallow water habitats and thus less likely to cause turbidity impacts to least tern foraging areas.

3. **Southeast Energy Island Pit.** The Southeast Energy Island Pit would allow for beneficial use of the dredged material by restoring benthic area similar to the surrounding shallower area. The cost for this site is relatively low. Although there are no significant impacts expected, there could be some temporary, short term turbidity in a shallow water area nearby which is within the vicinity of least tern foraging area.

4. **North Energy Island Pit.** The North Pit would also have ecological benefits for restoring the deep pit area to the surrounding shallower depths. The cost for using this pit is the

same as the Southeast Pit. However, it is about 500 feet closer to the shallow water foraging area, and there is a higher risk of turbidity impacts. In addition, as mentioned previously, several interests have informally requested that this pit be reserved for a possible future use.

5. **Ocean Disposal - LA-2**. The cost for disposal at LA-2 is significantly higher than the other options and would not result in any beneficial use of the material.

Description of Final Alternative Plans

The final alternative plans were formulated based on the uncompleted portion of the channel. All plans include the dredging required for the approach and entrance channels to provide channel widths for the design vessel at a depth of -76 feet MLLW. It also includes the additional tank capacity required to accommodate unloading the larger deliveries and aides to navigation. The final plans also incorporate the channel work completed by the Port of Long Beach in the main channel and turning basin.

In regard to disposal of dredged material, the final alternatives recognize that no one site could accommodate the total volume required and therefore assigns the maximum volume to each site selected to meet a specific objective and then filling the next best site that meets that objective, and so on, until 5.6 MCY of capacity was used.

Based on the above, the final three alternative plans are based on alternative dredge material placement scenarios described as follows:

Alternative A. Alternative A was formulated based on the preliminary assessments which show it to be plan with most beneficial use of dredged material based on economic and environmental considerations. The use of the material for Pier 400 would likely be less costly than the POLA option of obtaining an equivalent amount of material from other sources, and would likely have less impact than the alternative source of material. The disposal cost at Pier 400 is essentially the same as the other low cost options. Disposal in the main channel will be slightly less costly due to its close distance to the dredging area. Disposal at the Southeast Energy Island Pit would have some ecological benefits and would avoid or minimize any impacts to least tern foraging area.

Alternative A -

Pier 400 - 2.0 mcy
Main Channel - 2.1 mcy
Small (SE) Energy Island Pit- 1.5 mcy

Alternative B. Alternative B was formulated as the least costly option that does not include required re-handling at the Port of Los Angeles. It is a complete plan that is implementable if for some reason placement in Pier 400 becomes infeasible in the future due to unforeseen technical or schedule problems. The plan includes least cost disposal and would provide additional ecological benefits.

Alternative B -
Main Channel - 2.1 mcy
Small (SE) Energy Island Pit - 1.5 mcy
Large (N) Energy Island Pit - 2.0 mcy

Alternative C. Alternative C was formulated as a reasonable alternative to disposal in San Pedro Bay. It is an EPA designated ocean disposal area, and would likely be available if needed.

Alternative C -
LA-2 5.6 mcy

Alternative Evaluation by System of Accounts

A method of displaying the positive and negative effects of various proposed plans is to use the System of Accounts as suggested by the U.S. Water Resources Council. The accounts are categories of long-term environmental, economic, and other social impacts defined in such a manner that each proposed plan can be easily compared to other plans and to expected future conditions in the absence of any plan. The Water Resources Council suggests using four accounts to compare proposed water resource develoment plans. These are the national economic development (NED), environmental quality (EQ), regional development (RD), and other social effects (OSE) accounts.

National Economic Development (NED)

The intent of comparing alternative plans in terms of national economic development is to identify the beneficial and adverse effects that the plans may have on the national economy. Beneficial effects are considered to be increases in the economic value of the national output of goods and services attributable to a plan. For this project, the increases in NED are expressed in terms of transportation savings. Comparison of the alternative plans under consideration, using the NED account, is shown on Table IV-18. This table indicates that plans A and B have identical NED benefits. The average annual net benefits shown are the differences between the average annual economic benefits associated with each plan and the average annual costs of the plans.

Table IV-18 DESCRIPTION OF PLANS AND NED COMPARISON
PORT OF LONG BEACH (DEEPENING) FEASIBLITY STUDY
SYSTEM OF ACCOUNTS
NATIONAL ECONOMIC DEVELOPMENT

	No Action Plan	Plan A	Plan B	Plan C
I. Plan Description (Uncompleted Portion Only)				
Channel Depth (Ft. MLLW)	-60 mllw	-76 mllw	-76mllw	-76mllw
Dredged Material Volumes	0	5.6 mcy	5.6 mcy	5.6 mcy
Dredged Material Placement (CY)	0	Mn Ch. pit -2.1 S.E. pit -1.5 Pier 400 -2.0	Mn Ch.pit -2.1 S.E. pit -1.5 North pit -2.0	LA-2 -5.6
II. Project First Costs				
Total First Cost	0	$37,288	$37,288	$43,579
Int. During Construction	0	$2,715	$2,715	$3,214
Total Investment	0	$40,004	$40,004	$46,793
III. Average Annual Cost				
Interest and Amortization	0	$3,176	$3,176	$3,715
Operation and Maintenance	0	$0	$0	$0
Total Average Annual Cost	0	$3,176	$3,176	$3,715
IV. Average Annual Benefits	0	$34,685	$34,685	$34,685
V. Average Annual Net Benefits	0	$31,509	$31,509	$30,970
VI. Benefit-Cost Ratio		10.9	10.9	9.3

<u>**Environmental Quality**</u> (EQ)

The environmental quality account is another means of evaluating the alternatives to assist in making a plan recommendation. The EQ account is intended to display the long-term effects that the alternative plans may have on significant environmental resources. Significant environmental resources are defined by the Water Resources Council as those components of the ecological, cultural, and aesthetic environments which, if affected by the alternative plans, could have a material bearing on the decision making process. A comparison of the significant impacts that the proposed plans may have on EQ resources is shown on Table IV-19. This table illustrates that Plans A and B would have some beneficial impact in restoring the energy island pits to the shallower surrounding benthic habitat. All of the action alternatives would result in similar adverse short term impacts to air quality, but in general no significant adverse impacts are expected in the long term. This conclusion is supported by the environmental impact report/statement which follows this report. Alternatives A and B both show similar impacts, but Alternative A is designated the environmentally preferred plan because it is a beneficial reuse of the material, would minimize POLA requirement for obtaining material from other sources and any associated adverse impacts.

Table IV-19 EQ AccouPORT OF LONG BEACH (DEEPENING) FEASIBLITY STUDY
SYSTEM OF ACCOUNTS - ENVIRONMENTAL QUALITY

	No Action Plan	Plan A	Plan B	Plan C
I. Physical Environment				
a. Water Quality	no impact	temp., limited turbidity impact at dredge and disposal areas during construction	same as A.	same as A., but all outside of harbor
b. Air Quality	no impact.	temp. construction impact from hopper dredge emissions (about 18 mo.), but long term benefit from reduced tanker traffic - emissions reduced by 25% in yr. 2010 compared to No Action	same as A.	same as A.
c. Noise Conditions	no impact	temp. construction impact from hopper dredge	same as A.	same as A.
d. Shoreline Erosion	no impact	no signif. impact	no signif. impact	no signif. impact
II. Biological Environment				
a. Marine Resources	no impact	temporary loss of about 220 acres of deep soft bottom in pits during construction, but will fully recover within a year or so. Possible long term benefits from improving water circulation by filling pits	temporary loss of about 270 acres of deep soft bottom in pits, but will fully recover within a year or so. Possible long term benefits from improving water circulation by filling pits.	temporary loss of some deep soft bottom at LA-2, but will fully recover within a year or so.
b. Endangered Species	no impact	no effect	same as A.	same as A.
III. Cultural Environment				
a. Cultural Resources	no impact	possible construction. impact to shipwreck identified in approach channel, will be mitig. if needed	same as A.	same as A.
b. Aesthetics	no impact	short term impact during dredging operations from hopper dredge operating in harbor	same as A.	same as A.

104

Regional Economic Development (RED)

The regional economic development account is intended to illustrate the effects that the proposed plans would have on regional economic activity, specifically, regional income and regional employment. During construction, there will be some slight temporary increase in regional employment. Plan A would contribute to Port of Los Angeles plans for future development on the landfill and any associated regional benefits. Table IV-20 shows the RED Account impacts.

Other Social Effects (OSE)

The other social effects account typically includes long-term community impacts in the areas of public facilities and services, recreational opportunities, transportation and traffic, and man-made and natural resources. Table IV-20 shows the OSE impacts.

Table IV-20 - RED and OSE Account Impacts

PORT OF LONG BEACH (DEEPENING) FEASIBLITY STUDY
SYSTEM OF ACCOUNTS
REGIONAL ECONOMIC DEVELOPMENT AND OTHER SOCIAL EFFECTS

	No Action Plan	Plan A	Plan B	Plan C
I. Regional Economic Development				
a. Employment Labor Force	no impact	small temp. positive impact during construction only by creating 20 to 30 jobs for 18 to 24 mos.	same as A.	same as A.
b. Business and Industry Activity	no impact	no sig. impact	no sig. impact	no sig. impact
c. Local Government Finance	no impact	no sig. impact	no sig. impact	no sig. impact
II. Other Social Effects				
a. Public Health and Safety	no impact	improved AQ by fewer tanker trips	same as A.	same as A.
b. Public Facilities and Services	no impact	no impact	no impact	no impact
c. Recreation and Public Access	no impact	reduced tanker traffic will improve rec. boating in harbor	reduced tanker traffic will improve rec. boating in harbor	reduced tanker traffic will improve rec. boating in harbor
d. Traffic and Transportation	no impact	reduced tanker traffic by about 20%	reduced tanker traffic	reduced tanker traffic
e. Man-made Resources	no impact	no impact	no impact	no impact
f. Natural Resources	no impact	beneficial re-use of dredged material as fill for Pier 400 and pits.	beneficial re-use of dredged material as fill for pits	no impact

Associated Evaluation Criteria

The planning criteria are used to evaluate how different plans satisfy Federal Guidelines. They also provide the guidelines for successive narrowing of the alternative selection to a Recommended Plan. The four main evaluation criteria used in Corps plan formulation are effectiveness, efficiency, completeness, and acceptability. In the following sections, each alternative will be evaluated based on these criteria.

The final array of alternative plans were evaluated using four criteria suggested by the U.S. Water Resources Council. These criteria are completeness, effectiveness, efficiency, and acceptability.

Completeness

Completeness is a determination of whether or not the plan includes all elements necessary to achieve the objectives of the plan. The alternative plans are all complete. Each plan does, however, require measures to be implemented by the local sponsor after the initial construction of the project. These measures include the construction of additional landside tank storage and associated piping and equipment as described in the following Chapters. Details on Pier 400 placement under Alternative A must still be worked out with the Port of Los Angeles.

Effectiveness

Effectiveness is defined as a measure of the extent to which a plan achieves its objectives. All of the plans address the objective of improving efficiency of shipping operations at the same level.

Efficiency

Efficiency is the cost effectiveness of the plan expressed in net economic benefits. Alternatives A and B have the greatest net economic benefits and are therefore the most efficient.

Acceptability

Acceptability is defined as acceptance of the plan by the local sponsor and the concerned public. In general, Alternative A has the most support due to its being the most beneficial use of the material.

Trade Off Analysis

Action versus No Action

The most significant trade-off between action and no-action is between short term negative air quality impacts during construction and long term negative air quality impacts for no-action. The EIS clearly demonstrates that the long term benefits of a project outweigh the short term impacts of construction. Other trade-offs involve short term turbidity impacts with construction versus continued existence of pits causing poor water circulation with the no action plan.

Trade-offs Between Action Alternatives

Because Alternative A and B are relatively identical in economic efficiency and environmental impacts, the trade offs between the Alternative plans are primarily between these plans, which involve in-harbor disposal, and ocean disposal at LA-2. With in-harbor disposal, some benefits are realized by filling the pits and improving water circulation, but there will be some short term turbidity impacts that could affect the nearshore zone. With ocean disposal, there are no water circulation benefits, but there are also no short term turbidity impacts in the nearshore zone. However, because long term impacts are viewed as more significant, in-harbor disposal is preferred. In addition, the increased distance to the ocean disposal site means higher air quality impacts than in-harbor disposal as in Alternatives A and B. The major difference between Alternatives A and B is that Alternative A provides for the most beneficial use of the material from economic and environmental standpoints.

Designation of the NED Plan and Recommended Plan

NED Analysis

The depth optimization in the previous section showed that a dredge depth of -76' MLLW maximizes net benefits. The NED account table above shows that Alternatives A and B both show maximum annual net benefits, at $31,509,000.

RECOMMENDED PLAN

The Recommended Plan is Plan A, which is described in detail in the next chapter, but includes both the completed and uncompleted portions of the navigation channel. The uncompleted portion consists of the following:

1. Dredging:Approximately 5.6 MCY of material from channel shown on Figure IV-2

2. Placement of material in Pier 400, and Main channel and Southeast Energy Island Pits

3. Associated Features: Landside tanks required to accommodate the additional deliveries.

The completed portion of the Recommended Plan incorporates the channel deepening work to the optimized channel dimensions completed by the Port of Long Beach as part of their Pier J expansion project and providing credit as appropriate.

V. RECOMMENDED PLAN

GENERAL

The Recommended Plan is the NED Plan which includes two parts. They are: 1) adopting the advanced construction of the general navigation features in the Main Channel completed by the Port of Long Beach as part of their Pier J expansion project (completed portion), and 2) new dredging required to complete deeper channel access to Berth 121 (uncompleted portion). This Chapter presents specific information to describe the features, costs, benefits, and environmental considerations related to the Recommended Plan.

RECOMMENDED PLAN DESCRIPTION

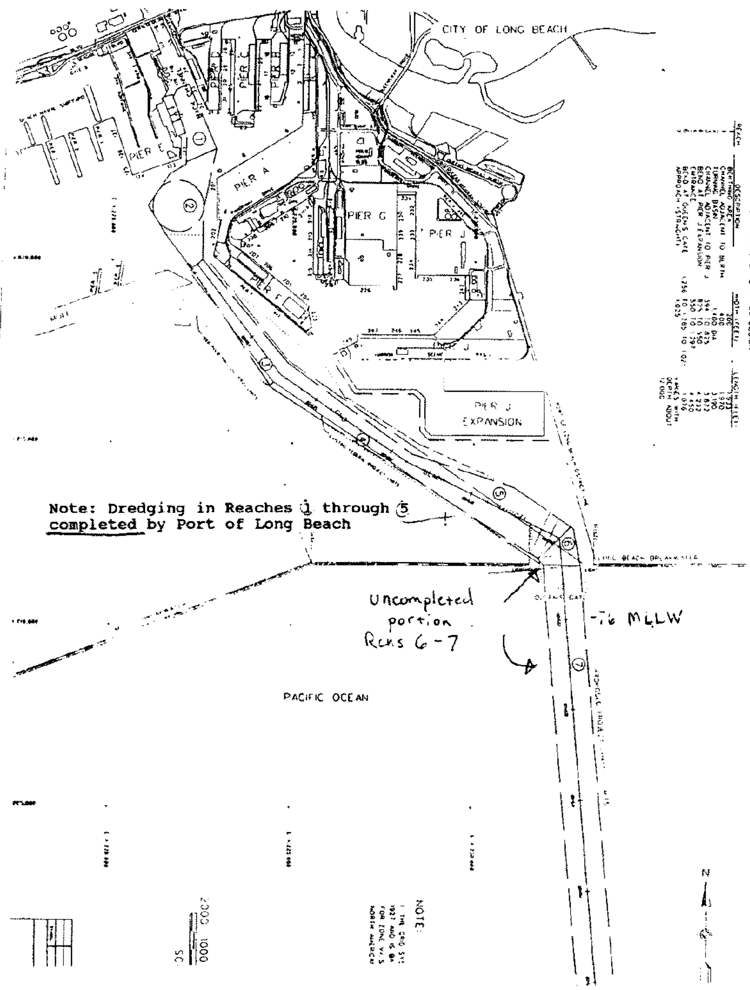
The Recommended Plan is shown in Figure V-1. The Plan provides for deepening the navigation channel and turning basin from -60 feet MLLW to -76 feet MLLW. The Recommended Plan includes incorporating the channel deepening work to the recommended plan dimensions completed by the Port of Long Beach as part of their Pier J expansion project (copleted portion). The Plan requires additional new dredging at and seaward from the breakwater to complete the navigation channel (uncompleted portion). Dredged material from the new dredging will be placed in nearshore borrow pit areas and Pier 400 as shown in Figure V-2.

General Navigation Features

The Plan consists of deepening the existing Federal approach and entrance channels to a depth of -76 feet, MLLW which allows safe one-way transit of deep-draft (325,000 DWT) liquid bulk vessels to Berth 121. Dimensions of the channel and turning basin are shown in Table V-1. The Plan incorporates the channel deepening completed in 1991 by the Port of Long Beach as part of their Pier J Expansion Project and new dredging also shown in Table V-1.

Disposal of remaining dredging required to complete the navigation channel, estimated to be 5.6 million cubic yards will be at the existing nearshore borrow pits located near the Energy Islands within the Long Beach Breakwater and in the Port of Los Angeles for placement in Pier 400 landfill.

FIGURE V-1. PORT OF LONG BEACH DEEPENING RECOMMENDED PLAN



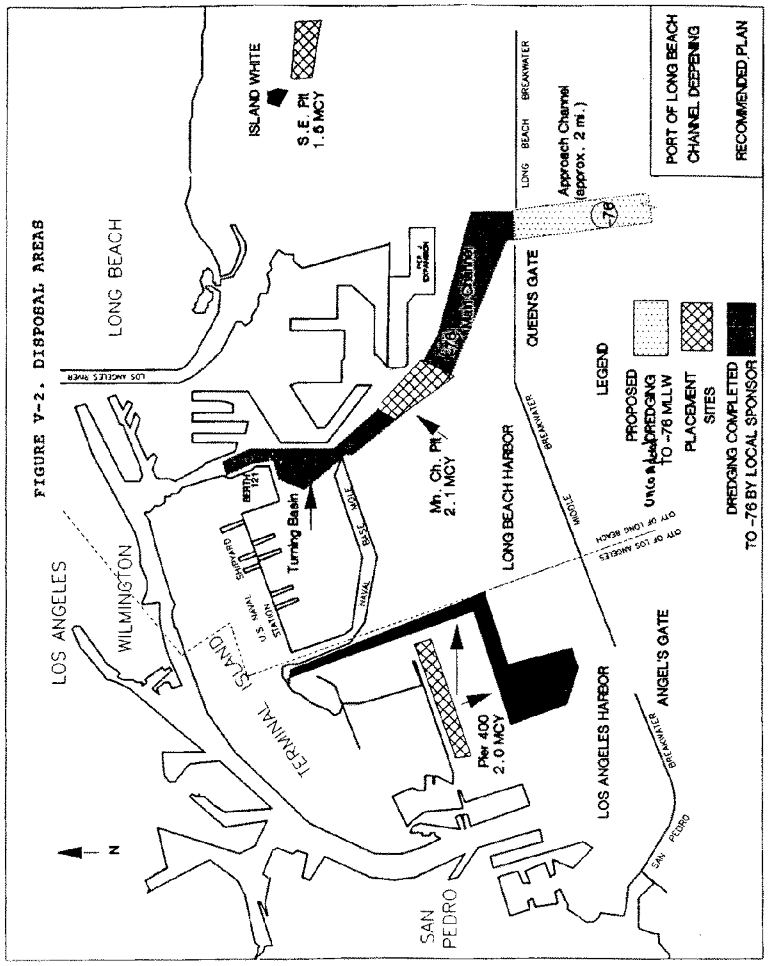


FIGURE V-2. DISPOSAL AREAS

TABLE V-1. RECOMMENDED PLAN (Completed and Uncompleted) CHANNEL DIMENSIONS

Reach	Centerline	
	Width (feet)	Length (feet)
Berthing Area*	200	1,933
Channel Adj to Berth*	400	1,970
Turning Basin*	1,400 Dia.	3,190
Chan. Adj. to Pier J*	400 to 900	3,022
Bend at Pier J*	900 to 600	4,232
Entrance*	600 to 1300	4,450
Bend at Gate	1300 to 1200	1,076
Approach (straight)	1200	approx. 12,000
*Channel work completed by Port of Long Beach		

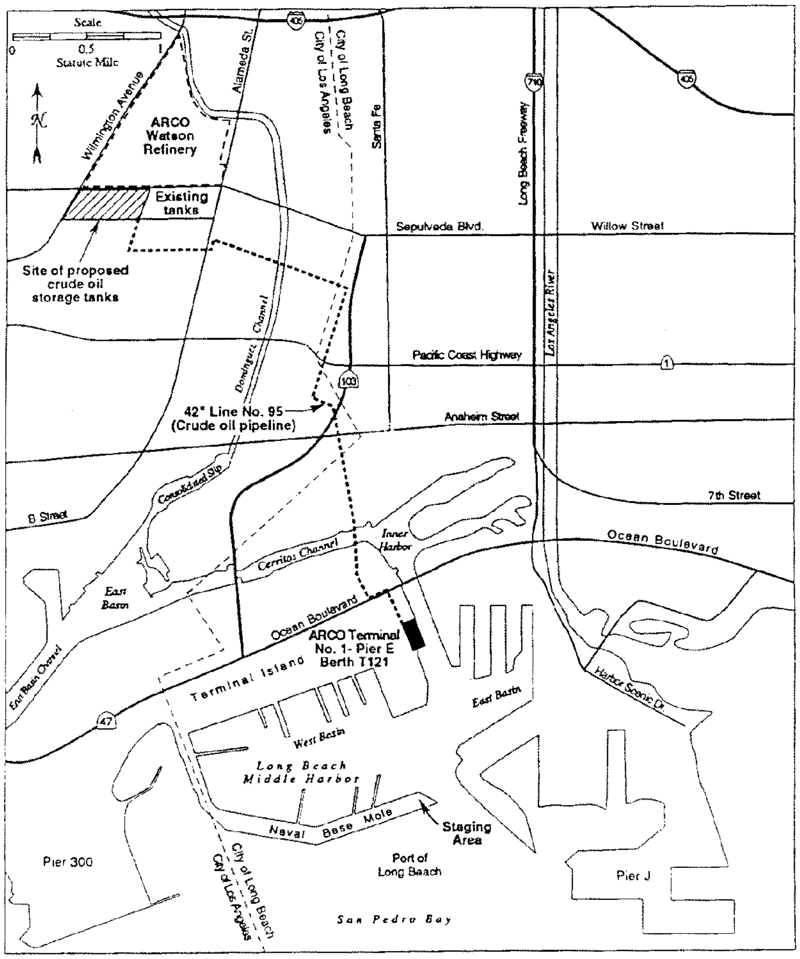
Associated Features

The associated features for the Recommended Plan includes the construction of about three storage tanks with a total increased capacity of about 1.05 million barrels and pipeline infrastructure to unload the deeper draft vessels within a reasonable time. This requirement will be accomplished by Arco Terminal Services as part of other tank construction work at existing parking areas on their properties located in the City of Carson, shown in Figure V-3. The existing dock and berth at Berth 121 was dredged to depth of -76 feet, MLLW as part of past ARCO project, and is considered adequate for the Recommended Plan.

Navigation Aides

Aids to navigation in the existing channel consist of lights marking the entrance to the Long Beach channel on the ends of the Middle Breakwater and the Long Beach Breakwater at Queens Gate, and several fixed position navigation buoys along the entrance channel. The U.S. Coast Guard, Eleventh District, has indicated (USACE, September 1992) that construction of this project will require relocation of two buoys in the entrance channel and one buoy in the approach. Four new buoys would be established in the approach channel and four buoys would be established in the entrance channel. Ranges are usually requested by the pilots.

FIGURE V-3. LOCATION OF ASSOCIATED FACILITIES AND STAGING AREA



Real Estate Requirements.

The real estate requirements associated with the Recommended Plan include acquiring;

a. Channel lands. The channels associated with the Recommended Plan are partially within the jurisdiction of the Port of Long Beach in accordance with the State Tidelands Trust Act of 1910 and partially under California State Lands Commission.

b. Disposal areas. The existing borrow pits are under the jurisdiction of the City of Long Beach. Meetings have been held with the City of Long Beach and they have indicated that they support disposal of material to fill or partially fill these pits.

c. Construction staging areas. It is expected that 1 to 2 acres of land will be needed for contractors office and equipment during the 2 year construction period. These lands as well as access to wharf areas for vessel fueling and repairs will be arranged by the Port of Long Beach on existing facilities at the eastern end of the Navy mole as shown in Figure V-3.

d. Utility relocations. There are no utility or other facility relocations required as a result of the Recommended Plan.

PROJECT COSTS

Table V-2 presents a summary of the project costs for the Recommended Plan (uncompleted portion) based on October 1995 price levels. Table V-3 presents the estimated costs of the Recommended Plan (completed and uncompleted portions) required to provide the design channel dimensions (including the estimated cost of dredging completed by the Port of Long Beach and remaining dredging included in the Recommended Plan). The estimated costs for dredging for the Recommended Plan and work completed by the Port reflect disposal in the in-harbor pit areas which is the most cost effective method of disposal. These estimates are based on applying M-CACES procedures and the Corps of Engineers' Dredge Estimating Program. This program was developed to estimate dredging costs based on detail analysis of dredge operation requirements and prices based on industry standards.
The costs for aids to navigation are estimated to be $100,000 based on information from the U.S. Coast Guard presented in Appendix A.

Estimates for associated costs are $20,000,000 based on information received from Arco Terminal Services, which is presented in Appendix A.

TABLE V-2. PROJECT COST ESTIMATE FOR THE RECOMMENDED PLAN (UNCOMPLETED PORTIONS)

CODE OF ACCT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	COST WITHOUT CONTING	CONTING	COST WITH CONTING
120	CHANNEL DREDGING						
120A	MOB/DEMOB	1	JOB	LUMP SUM	$900,000	20%	$1,080,000
1203B	DREDGING -OUTSIDE BKWTR	4,229,000	CY	$2.25	$9,516,000	10%	$10,467,000
1203B	DREDGING (OVERDEPTH)	1,342,000	CY	$2.25	$3,020,000	10%	$3,321,000
	SUBTOTAL				$13,436,000		$14,868,000
30	PED	1	JOB	$750,000.00	$750,000	-	$750,000
30J	ENGR DUR CONST	1	JOB	$550,000.00	$550,000	-	$550,000
31	CONSTRUCT MGMT	1	JOB	$950,000.00	$950,000	-	$950,000
	SUBTOTAL				$15,686,000		$17,118,000
	LERRDS	2	ACRES	$25,000.00	$50,000	10%	$60,000
09.1.8	AIDS TO NAVIGATION	1	JOB	$100,000.00	$100,000	10%	$110,000
	ASSOCIATED COSTS						
	STORAGE TANKS	1	JOB	$20,000,000.00	$20,000,000	-	$20,000,000
	SUBTOTAL	1	JOB	$20,000,000.00	$20,000,000	-	$20,000,000
	TOTAL PROJECT COSTS (WITHOUT CONTINGENCY)				$35,836,000		
	TOTAL PROJECT COST (WITH CONTINGENCY)						$37,288,000

TABLE V-3. PROJECT COST ESTIMATE FOR THE COMPLETED AND UNCOMPLETED PORTIONS OF THE RECOMMENDED PLAN (OCTOBER 1995 PRICE LEVELS) (see footnote (1))

CODE ACCT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	COST W/OUT CONT.	CONTING	COST W/CONTING
120	CHANNEL DREDGING						
120A	MOB/DEMOB	1	JOB	LUMP SUM	$2,100,000	20%	$2,520,000
1203B	DREDGING - IN BKWTR	5,743,000	CY	$2.25	$12,291,000	10%	$14,214,000
1203B	DREDGING - IN BKWTR OD	600,000	CY	$2.25	$1,350,000	10%	$1,485,000
1203B	DREDGING - OUT BKWTR	4,229,000	CY	$2.25	$9,516,000	10%	$10,467,000
1203B	DREDGING - OUT BKWT OD	1,342,000	CY	$2.25	$3,020,000	10%	$3,321,000
	SUBTOTAL				$28,907,000		$32,007,000
30	PED	1	JOB	$1,177,000.00	$1,177,000	-	$1,177,000
30	ENGR DURING CONST	1	JOB	$750,000.00	$750,000	-	$750,000
31	CONSTRUCT MGMT	1	JOB	$1,285,000.00	$1,285,000	-	$1,285,000
	SUBTOTAL				$32,119,000		$35,219,000
	LERRDS	4	ACRES	$25,000.00	$100,000	20%	$120,000
09.1.B	AIDS TO NAVIGATION	1	JOB	$100,000.00	$100,000	10%	$110,000
	ASSOCIATED COSTS						
	STORAGE TANKS	1	JOB	$20,000,000.00	$20,000,000	-	$20,000,000
	SUBTOTAL	1	JOB	$20,000,000.00	$20,000,000	-	$20,000,000
	TOTAL PROJECT COSTS (WITHOUT CONTINGENCY)				$52,319,000		
	TOTAL PROJECT COST (WITH CONTINGENCY)						$55,449,000

(1) (Plan described in Table V-1 - includes costs based on pre-Pier J expansion bathymetry with material disposal in non-Pier J areas due to lower costs).

The cost estimates include contingencies for each cost item based on the analysis of the accuracy of information used for the designand costs. The cost estimate also includes the estimated cost for Engineering and Design and Supervision and Administration of construction. Details on the cost estimate are presented in the Cost Estimating Appendix.

Annual Costs

The estimated annual costs for the Recommended Plan are also presented in Table V-4. The annual costs reflect disposal as part of the recommended plan, and include interest and amortization of the total economic cost to construct the project, including interest during construction, a discount rate of 7-3/4 percent and 50-year project life. Shoaling of the channel is not expected due to limited transport through the area. Accordingly, periodic dredging is not expected to be necessary to maintain the depths provided by the Recommended Plan and no additional costs for Operations and Maintenance were shown.

PROJECT BENEFITS

The benefits of the Recommended Plan are based on transportation savings reflect the economy of scale savings resulting from vessels being able to load deeper and larger vessels to be used on the long haul trade routes. The benefits, shown in Table V-4, are based on operating cost of vessels provided by the Corps of Engineers Water Resources Support Center dated February 1995.

ECONOMIC ANALYSIS

Table V-4 also presents the economic analysis for the Recommended Plan (uncompleted portion) and the estimated costs for dredging completed by the Port of Long Beach (completed portion).

The average annual cost of the **uncompleted portion** of the plan is $3,176,000, and the average annual transportation savings (benefits) is $34,685,000. The project therefore has a B/C ratio of 10.9 to 1, with average annual net benefits of $31,509,000, if sunk costs associated with the completed portion of the plan are neglected.

If the sunk costs associated with the dredging completed by the Port are considered, the average annual cost for the **Recommended Plan, including completed and uncompleted portions,** is $4,714,000, the net benefits are $29,981,000, and the BCR is 7.1 to 1.

TABLE V-4. ECONOMIC ANALYSIS OF RECOMMENDED PLAN

ITEM	RECOMMENDED PLAN (1)	UNCOMPLETED PORTION OF RECOMMENDED PLAN (2)
PROJECT ECONOMIC COSTS	$55,449,000	$37,288,000
FIRST COST		
INTEREST DURING CONSTRUCTION	$4,048,000	$2,715,000
TOTAL PROJECT ECONOMIC COSTS	$59,497,000	$40,004,000
ANNUAL COST		
INTEREST AND AMORTIZATION	$4,724,000	$3,176,000
OPERATION AND MAINTENANCE	0	0
TOTAL ANNUAL COST	$4,724,000	$3,176,000
ANNUAL BENEFITS		
TRANSPORTATION SAVINGS	$34,685,000	$34,685,000
TOTAL ANNUAL BENEFITS	$34,685,000	$34,685,000
NET ANNUAL BENEFITS	$29,961,000	$31,509,000
BENEFIT/COST RATIO	7.3:1	10.9:1

(1) - Includes costs based on pre-Pier J Expansion conditions using October 1995 price levels, as described in Table V-3. Assumes that dredged material placement is in the most cost effective and environmentally acceptable disposal site (not Pier J disposal).

(2) - Includes costs for the uncompleted portion (approach channel) only, as described in Table V-2, using October 1995 price levels.

ENVIRONMENTAL IMPACTS

The environmental impacts and mitigation plans associated with the uncompleted portion of the Recommended Plan are presented in detail in the Environmental Impact Statement/Report (EIS/EIR) included in the Feasibility Report. A summary of the impacts is given below. The analysis was based on without and with project assessment of impacts to environmental resources and attributes, regional economic development, and other considerations including cultural and historical resources, infrastructure facilities, transportation, and community functions and activities.

Environmental resources and attributes addressed in the EIS/EIR include: topography and geology, oceanography and water quality, marine resources, air quality, noise, cultural resources, land and water use, ground transportation, vessel transportation, and aesthetics; socioeconomic effects are also addressed.

Environmental impacts were evaluated for the dredge site and the potential placement sites (see EIS). For most of the resources, the impacts would be comparable regardless of the placement site selected. The only significant unavoidable impact would be a short-term impact on air quality during construction. All other resources addressed in this document would experience either adverse but insignificant impacts or no impact during construction. The project would result in several beneficial impacts, and there would be no long-term unavoidable significant impacts.

The construction significant air quality impact is an exceedance of the significance thresholds for emission of oxides of Nitrogen (NOx) and reactive organic compounds (ROC), established by the South Coast Air Quality Management District. These emissions would come from the dredge and associated support equipment during construction. and would be above the designated significance thresholds. However, the temporary increase in emissions during construction would be offset by a long-term reduction in emissions from fewer and more fully loaded tanker vessels that would be required to transport the same amount of cargo. After the appproach channel is deepened, long term NOx emissions from tankers would be reduced by about 6.4 tons per year from current levels and 13.7 tons per year compared to the no-action alternative in the year 2010. Similarly, long-term ROC emissions from tankers would be reduced .4 tons per year from current levels and .8 tons per year compared to the no-action alternative in the year 2010. Emissions of other pollutants, which would not exceed significance thresholds, would also be reduced over the long term.

The project would result in several other beneficial impacts. Filling the pits could improve the local ecology because a shallower water habitat is generally more productive than deeper waters. It would also increase the amount of habitat suitable for California Halibut spawning, which could result in increased catches if other factors do not limit recruitment into the adult population.

The deeper channels would result in a long-term beneficial irpact on vessel transportation by allowing supertankers to enter the port fully loaded, requiring fewer vessel calls to transport the same amount of cargo. The project would provide jobs to approximately 20 people during the 18 to 20 month construction period. Additional local economic benefits would result from the purchase of construction materials and other related services.

The EIS/EIR studies also indicate there would be either no impact or insignificant impacts on the following other conditions and resources: topography and geology, oceanography and water quality, marine resources, noise, land and water use, ground transportation, and aesthetics.

VI. PLAN IMPLEMENTATION

GENERAL

The Federal Government through the Corps of Engineers and in partnership with the Port of Long Beach will be responsible for implementing and maintaining the general navigation features of the project.

COST APPORTIONMENT

Apportionment of total project costs between Federal and non-Federal interests for the Recommended plan were derived in accordance with the provisions of Section 101 of the Water Resources Development Act of 1986 (Public Law 99-662), and applicable policies and regulations contained in Engineering Regulation 1105-2-100 dated 28 December 1990, and other Corps of Engineers guidance.

COST-SHARING REQUIREMENTS

Section 101 of the 1986 Water Resources Development Act specifies non-Federal Cost Sharing for general commercial navigation features that varies according to water depth. The requirements for cost-sharing are listed in Table VI-1.

Repayment

In addition to the above cost-sharing requirement, Section 101 of the 1986 Water Resources Development Act requires non-Federal interests to repay 10 percent of project costs with interest over a period not to exceed 30 years. This would apply to the construction costs for the general navigation features and any associated mitigation. The non-Federal interest may receive credit towards this 10 percent repayment for costs for lands, easements, rights-of-way, relocations, and disposal areas.

CREDIT FOR COMPLETED WORK

Section 4 of the 1988 Water Resources Development Act both include provisions which may allow the Port Long Beach to receive credit for work completed on the Federal navigation project. Requests to receive such credit were submitted to the Assistant Secretary of the Army for Civil Works by the Port of Long Beach for work in deepening the entrance and main channels as part of their Pier J

TABLE VI-1 NON-FEDERAL SHARE OF COSTS, COMMERCIAL Navigation Required by 1986 Water Resources Development Act

	Up to 20 Feet	Greater than 20 Feet to 45 Feet	Greater than 45 Feet
Construction			
General Navigation Features	10%	25%	50%
Aids to Navigation	0	0	0
Mitigation (Environmental)	10%	25%	50%
Fish & Wildlife Enhancement	0-25%	0-25%	0-25%
Service Facilities	100%	100%	100%
Lands, Easements, Rights of Way, Relocations, Disposal	100%	100%	100%
Operation & Maintenance			
General Navigation Features	0	0	50%
Aids to Navigation	0	0	0
Mitigation (Environmental)	0	0	50%
Fish & Wildlife Enhancement	0-25%	0-25%	0-25%
Service Facilities	100%	100%	100%

Expansion Project. The Port was advised that no decision can be made on credit until the feasibility report was completed and a Federal project was approved.

The estimate of credit to be provided for the work completed by the Port of Long Beach is based on guidance contained in paragraph 4c of CECW-PW Memorandum dated 3 May 1995, subject: Port of Long Beach (Deepening), California-Plan Selection Briefing Guidance Memorandum, which states "The estimate of credit that the POLB may be eligible for will be based on current price levels but adjusted to 1990 price levels and involves the following procedure:

(1) Developing the total cost and cost-sharing of the NED plan for dredging the entire channel including creditable work completed by the Port of Long Beach and remaining dredging required by the recommended plan;

(2) Developing the Cost for the remaining work that is included in the recommended plan;

(3) Comparing the difference in costs to establish the credit associated with the work completed by the Port of Long Beach;

(4) Developing the Federal share of the cost of the NED plan work completed by the Port of Long Beach;

(5) The Port of Long Beach would be eligible for credit based on the lesser of the Federal share of the cost using the NED plan at the time of construction (1990) by the Port of Long Beach of the Recommended Plan or the Federal share of the actual cost incurred by the Port of Long Beach at the time the work was completed. The cost incurred by the Port of Long Beach at the time the work was completed will be based on information provided by the Port of Long Beach on actual costs. No audit will be required as part of the feasibility study, however, an audit of the Port of Long Beach work will be required prior to execution of the Project Coopreration Agreement.

COST APPORTIONMENT FOR THE RECOMMENDED PLAN

Table VI-2 presents the results of applying the above requirements and procedures to derive the Federal and non-Federal costs of the Recommended Plan. The determination of the eligible credit to the Port of Long Beach for the channel dredging they completed examined actual cost information provided by the Port. The unit cost was based on a weighted average of actual dredging costs within the Recommended channel dimensions in the completed portion. This is discussed in Chapter IV and was $2.70 per yard.

This information implies actual cost of dredging performed by the Port ($2.70 per yard plus landfill mitigation) is higher than that presented in the Recommended Plan, which provides the basis for determining the cost if the work was performed by the Federal Government. This will be further reviewed based on an audit of these costs during preparation of final plans and specifications and Project Cooperation Agreements.

The guidance provided by HQUSACE also indicates that the cost eligible for credit must be based on the cost of the work at the time of construction, which is 1990 price levels. The difficulty in establishing the difference in cost between 1995 and 1990 price levels relates to the highly competetive nature of the dredging industry and its impacts on project costs. For example, the cost of dredging for the Port of Long Beach in 1990 ranged from about $2.00 to $3.00 per cubic yard, while the recent contract awarded for the Port of Los Angeles resulted in prices of about $1.50 to $3.25 per cubic yard depending on specific type of material, compaction, and disposal site. In addition, the mobilization costs for equipment is highly dependent on the vicinity that the companies are operating at the time of expected construction. Accordingly, there is expected to be little, if any, difference between the cost of the project based on 1990 or 1995 price levels.

TABLE VI-2. RECOMMENDED PLAN COST-SHARING

DESCRIPTION	RECOMMENDED PLAN	UNCOMPLETED PORTION OF THE RECOMMENDED PLAN	DIFFERENCE BETWEEN PLANS ELIGIBLE FOR CREDIT	ACTUAL COSTS ASSOC W/PIER J CONSTR. (1)
GENERAL NAVIGATION FEATURE				
MOB AND DEMOB	$2,520,000	$1,080,000	$1,440,000	$2,800,000
DREDGING - IN BKWTR	$14,214,000		$14,214,000	$17,010,000
DREDGING - IN BKWTR OD	$1,485,000		$1,485,000	(incl. above)
DREDGING - OUT BKWTR	$10,467,000	$10,467,000		
DREDGING - OUT BKWTR OD	$3,321,000	$3,321,000		
MITIGATION - DISPOSAL	$0	$0	$0	$6,820,000
SUBTOTAL	$32,007,000	$14,868,000	$17,139,000	$26,630,000
PED	$1,177,000	$750,000	$427,000	$500,000
ENGR DURING CONSTRUCTION	$750,000	$550,000	$200,000	$300,000
CONSTRUCTION MGMT	$1,285,000	$950,000	$335,000	$300,000
SUBTOTAL GNF COSTS	$35,219,000	$17,118,000	$18,101,000	$27,730,000
FEDERAL SHARE (50%)	$17,609,500	$8,559,000	$9,050,500	
NON-FEDERAL SHARE (50%)	$17,609,500	$8,559,000	$9,050,500	
CREDIT FOR WORK COMPLETED				
REIMBURSEMENT 10 % GNF LESS LERRDS			$1,750,000	
TOTAL FEDERAL GNF WITHOUT CREDIT			$7,300,500	
TOTAL NON-FED GNF WITHOUT CREDIT			$10,800,500	
AMOUNT ELIGIBLE FOR CREDIT		$7,300,500		
TOTAL FEDERAL GNF WITH CREDIT		$15,859,500		
TOTAL NON-FED GNF WITH CREDIT		$1,258,500		
LERRDS	$120,000	$60,000		
NON-FEDERAL SHARE (100%)	$120,000	$60,000		
AIDS TO NAVIGATION	$110,000	$110,000		
FEDERAL SHARE (100%)	$110,000	$110,000		
ASSOCIATED COSTS	$20,000,000	$20,000,000		
NON-FEDERAL SHARE (100%)	$20,000,000	$20,000,000		
TOTAL PROJECT COSTS	$55,449,000	$37,288,000		
TOTAL FEDERAL COSTS	$17,719,500	$15,969,500		
TOTAL NON-FEDERAL COSTS	$37,729,500	$21,318,500		
REIMBURSEMENT 10 PERCENT OF GNF LESS LERRDS	$3,402,000	$1,652,000		
TOTAL FEDERAL PROJECT COST	$14,317,500	$14,317,500		
TOTAL NON-FEDERAL PROJECT COST	$41,131,500	$22,970,500		

(1) - INCLUDES ONLY PORTIONS ASSOCIATED WITH CHANNEL DREDGING AND LANDFILL MITIGATION; DOES NOT INCLUDE DIKES IN ANY COST ITEM.

DIVISION OF PLAN RESPONSIBILITIES

The Federal Government and the Port of Los Angeles are responsible for implementation of the Recommended Plan, including the sharing of costs and maintenance. In addition certain responsibilities are required by each party in accordance with Federal law.

Federal Responsibilities

Responsibilities of the Federal Government for implementation of the Recommended Plan include:

a. Sharing a percentage of the costs for Planning, Engineering and Design (PED), including preparation of the Feature Design Memoranda, and Plans and Specifications, which is cost shared at the same percentage that applies to construction of the general navigation features. This applies to both the completed portion of the Recommended Plan (credit) and the uncompleted portion (cost-sharing).

b. Sharing a percentage of construction costs for general navigation features (i.e. channel dredging) and associated mitigation features, that varies according to the range of water depths where the proposed work is to be done (20 feet or less, between 20 and 45 feet, and over 45 feet). See Table VI-1. This applies to both the completed portion of the Recommended Plan (credit) and the uncompleted portion (cost-sharing).

c. Providing 100%, via the U.S. Coast Guard, of the cost for aids to navigation (e.g Buoys, lights, markers), including installation and maintenance.

d. Administering contracts for construction and supervision of the project after authorization funding, and receipt of non-Federal assurances.

e. Providing 100% of the cost of operation and maintenance of the general navigation and mitigation features for work in 45-foot depths or less and sharing 50% of these costs for depths deeper than 45 feet. This applies to both the completed portion of the Recommended Plan (credit) and the uncompleted portion (cost-sharing). However, this is moot because there are no significatn O&M costs anticipated.

Non-Federal Responsibilities

Federal law requires that a local non-Federal sponsor provide and guarantee certain local cooperation items to ensure equitable participation in a project and to ensure continual maintenance and public receipt of the intended benefits. The particulars of the Recommended Plan were carefully reviewed and a set of applicable local cooperation items established to include cost sharing of the

Project as prescribed in the above paragraphs. Final costs required from the Port of Long Beach will reflect credit for work completed on the NED Plan. This credit is, however, subject to audit before execution of the Project Cooperation Agreement (PCA). The non-Federal Responsibilities are:

a. Pay during the period of construction 50 percent of the cost of construction of the uncompleted portion of the general navigation features of the Recommended Plan having a depth in excess of 45 feet, plus 25 percent of the cost of construction of the portion of the general navigation features for the uncompleted portion of the Recommended plan having a depth in excess of 20 feet but not in excess of 45 feet, plus 10 percent of the cost of construction of the uncompleted portion of the general navigation facilities for the NED plan having a depth not in excess of 20 feet, minus the estimated $7,300,500 credit, determined to be the Federal share of the completed portion of the GNF of the Recommended Plan;

b. Pay with interest over a period not to exceed 30 years following completion of construction an additional 10 percent of the total cost of construction of the general navigation features of the Recommended Plan, the interest to be determined pursuant to Section 106 of Public Law 99-662. The value of lands, easements, rights-of-way, relocations (other than utility relocations), and borrow and dredged or excavated material disposal areas and costs of utility relocations borne by the sponsor for the Recommended plan shall be credited toward this required payment;

c. Pay 100 percent of any actual construction costs of general navigation features that are in excess of the Government estimate of the costs of general navigation features of the NED plan;

d. Provide all lands, easements, and rights-of way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of the project;

e. Provide or pay the cost of providing all retaining dikes, wasteweirs, bulkheads,, and embankments, including monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of the project;

f. Hold and save the United States free from all damages due to the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors;

g. Assume responsibility for construction and installation of all non-Federal project features of the Recommended Plan, concurrent with construction of Federal project general navigation features of the Recommended Plan including additional pump capacity and storage tank facilities;

h. Provide and maintain adequate public terminal and transfer facilities open to all on equal terms and with such depths from the Federal channel line to and between the wharves at the terminal (berthing areas) as may be required for accommodation of vessels at the terminal, consistent with the Federal project;

i. Prohibit erection of any structures or berthing of any vessels that would encroach on the authorized general navigation features;

j. Perform prior to initiation of construction, and thereafter as determined necessary,environmental investigations to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, in or under all lands, easements and rights of way necessary for construction, operation, and maintenance of the project;

k. Assume complete financial responsibility for cleanup and response costs of any CERCLA regulated materials located in, on or under lands, easements, or rights of way necessary for the construction, operation, and maintenance of the project; and be responsible for operating, maintaining, repairing, replacing, and rehabilitating the project in a manner so that liability will not arise under CERCLA;

l. Pay one-half of the excess of the cost of operation and maintenance of the general navigation features of the project over the cost of which the Government determines would be incurred for operation and maintenance if the project had a depth of 45 feet below mean lower low water (MLLW);

m. Provide, operate, maintain, repair, replace,, and rehabilitate, at its own expense, all project features other than those for general navigation;

n. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project;

o. Keep, and maintain, books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs;

p. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CRF Part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

q. Comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500,II issued pursuant thereto and published in Part 300 of Title 32, case of Federal Regulations, as well as Army Regulation 66-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army, " and

r. Ensure that lands created by the project are retained in public ownership for uses compatible with the authorized purposes of the project, and regulate the use, growth, and development on such lands to those industries whose activities are dependent upon water transportation.

FINANCIAL ANALYSIS

Financing Plan.

Table VI-3 presents funding requirements by each fiscal year for project implementation. This involves completing preconstruction engineering and design including preparation of plans and specifications,the project cooperation agreement, and project construction, including physical and financial completion of all work related to the project. The financing plan reflects Federal and non-Federal responsibilities and project cost sharing, including estimates of credit eligibility as outlined in this Chapter. Federal funds will be programmed each year in accordance with Federal budget policies and guidelines.

Table VI-3 Expenditures by Fiscal Year for the Recommended Project ($1000 - October 1995 Price Level)

WORK ACTIVITY	FY 1996		FY 1997		FY 1998		FY 1999	
	FED	POLB	FED	POLB	FED	POLB	FED	POLB
PED	750							
CONSTRUCT			6000	1258.5 (a)	8109.5		+1652 (b)	-1652 (b)
AIDS TO NAV					110			
TOTAL								
REAL ESTATE				60				
ASSOC COST				10000		10000		
TOTAL	750		6000	11318.5	8219.5	10000		1652

(a) Includes non-Federal share of PED
(b) Reimbursement of 10 percent of the cost of general navigation features less LERRDs.

Statement of Financial Capability

The Port of Long Beach has indicated in their letter of intent and financial capability of September 27, 1995, that funding will be programmed when required from their general revenues. As indicated in this letter and shown on Table VI-4, Port net revenues have been around $50,000,000 for the last two years and this is expected to continue to increase due to new container terminals in operation.

Assessment of Financial Capability

Due to the high net revenues of the local sponsor (especially when compared to the required expenditures)and the expected increase in net revenues, financing the non-Federal share of the general navigation features is not expected to be a problem. The financing of the associated costs involving construction of the additional tankage is expected to be accomplished by users of the terminal, but is still well within the sponsor's financial capability.

TABLE VI-4 PORT OF LONG BEACH NET REVENUES

FISCAL YEAR	1992	1993	1994
NET REVENUES	$26,700,000	$52,300,000	$48,800,000

PROJECT MANAGEMENT PLAN

A Project Management Plan for implementation of the Recommended Plan has been prepared in accordance with current Corps of Engineers regulations and procedures. The plan includes a detailed program, listing and scheduling the activities and responsibilities necessary to implement the Recommended Plan, including activities required to complete Preconstruction Engineering and Design, prepare and negotiate the Local Cooperation Agreement, and complete Construction.

Local Cooperation Agreement

Subsequent to appropriation of construction funds by Congress but prior to advertisement for the Construction Contract, a Local Cooperation Agreement will be required to be signed by the Federal Government and the Port of Long Beach committing each party to the responsibilities for implementing and maintaining the project. This agreement will be prepared and negotiated during Preconstruction Engineering and Design Phase for implementing the Recommended Plan. It is proposed that a single Local Cooperation Agreement be executed for the Recommended Plan. The procedures to be used in preparing and negotiating the final cost-sharing agreement will be further defined during Pre-Construction Engineering and Design when a final construction schedule is developed, and are contained in the Project Management Plan.

Project Approval and Implementation

The necessary reviews and activities leading to approval and implementation of the Recommended Plan are listed below:

a. The report will be reviewed by the Corps of Engineers, South Pacific Division Commander, who will then issue a public notice announcing completion of the final report.

b. The report will then be submitted for concurrent review by the Headquarters, U.S. Army Corps of Engineers (HQUSACE), and Assistant Secretary of the Army - Civil Works (ASA-CW).

c. The 90-day State and agency review and coordination of the Environmental Impact Statement by HQUSACE will be ongoing concurrently during the Washington level review.

d. Washington level review will conclude with a Washington level final assessment and the documentation of report review prepared by HQUSACE staff.

e. The Washington level decision making process will follow the decision making sequence of HQUSACE and ASA(CW), once the documentation of report review has been completed. The report and will than be forwarded for approval by the Chief of Engineers, and then to ASA(CW) for coordination with the Office of Management and Budget (OMB).

f. Funds could be provided, when appropriated in the budget, for preconstruction, engineering and design (PED), upon issuance of the Division Commander's public notice announcing the completion of the final report and pending project authorization for construction.

g. Surveys, model studies, and detailed engineering and design for PED studies will be accomplished first and then plans and specifications would be completed, upon receipt of funds.

h. Subsequent to appropriation of construction funds by Congress, but prior to advertisement for the construction contract, formal assurances of local cooperation in the form of a Local Cooperation Agreement would be required from non-Federal interests (the Local Sponsor).

i. Construction would be initiated with Federal and non-Federal contributed funds, once the construction project was advertised and awarded.

Section 201 of the 1986 Water Resources Development Act and Section 4 of the 1988 Water Resources Development Act include provisions which authorize Federal navigation improvements at the Ports of Los Angeles and Long Beach, subject to the recommendations of the Chief of Engineers and approval by the Secretary of the Army. Subject to a favorable Chief's Report, it is anticipated that no further authorization will be required.

Implementation Schedule

The implementation schedule for the Recommended Plan is presented in Table VI-3.

TABLE VI-5. MILESTONES FOR IMPLEMENTATION OF RECOMMENDED PLAN

MILESTONE NUMBER	DESCRIPTION	SCHEDULE
170	COMPLETE FEASIBILITY REPORT/DE NOTICE ----	JAN 1996
30	REPORT OF THE CHIEF OF ENGINEERS ----------	APR 1996
340	ASA(CW) TRANSMITTAL OF REPORT TO CONGRESS -	JUN 1996
200	INITIATION OF PED -------------------------	FEB 1996
290	COMPLETION OF PED -------------------------	DEC 1996
590	APPROVAL OF P&S ---------------------------	DEC 1996
680	PCA APPROVED BY OASA(CW) ------------------	JAN 1997
920	FUNDED IN APPROPRIATIONS ACT --------------	OCT 1996
690	PCA EXECUTED ------------------------------	JAN 1997
950	CONSTRUCTION CONTRACT ADVERTISED ----------	MAR 1997
960	CONSTRUCTION CONTRACT AWARDED -------------	JUN 1997
999	PROJECT COMPLETE -------------------------	DEC 1998

VII. COORDINATION AND PUBLIC VIEWS

Public workshops, scoping meetings, and coordination with Federal, State, and local agencies have been accomplished to aid in the formulation and evaluation of the proposed recommended Plan.

The Recommended Plan was presented to the Public at a Public meeting held 29 June 1995. Several people expressed support for the project. The only concern expressed was by a representative of the Alamitos Shores Beach Preservation Group, a private homeowners organization. This group was interested in a beach nourishment project using the dredge material from the Long Beach channel. Several potential beach nourishment plans were developed in coordination with this group and the City of Long Beach, but unfortunately, geotechnical investigations showed the material unsuitable for beach nourishment, and these plans could not be incorporated into the Recommended Plan.

In addition, meetings were held with harbor pilots to refine problems and needs and determine actual operating practices. The pilots expressed some concern about the channel design, and their concerns were incorporated into the Recommended Plan.

Public and agency views including comments received to date from representatives from EPA, US Fish and Wildlife Service, National Marine Fisheries, California State Fish and Game, and the City of Long Beach have indicated no opposition or major concerns with the proposed Recommended Plan.

At a meeting held in Eureka, California on September 13, the California Coastal Commission voted to unanimously concur with the Coastal Consistency Determination for the Recommended Plan.

A draft Fish and Wildlife Coordination Act Report (CAR) has been received and is included in the draft EIS/EIR. This draft CAR indicates no opposition to the project, but recommends several actions including developing a regional dredge material management strategy and mitigating potential turbidity and noise disturbance during construction.

The project was formulated with a regional dredge material management strategy in mind. The disposal plan for the dredged material is consistent with the desires of all concerned interests, and is considered acceptable at this time. The Corps does not anticipate any significant turbidity or noise impacts to endangered species during construction, but will continue working with the Fish and Wildlife Service to resolve any remaining issues.

VIII. RECOMMENDATION

Based on our analyses of problems and needs to meet present and future demands for crude petroleum movements through Long Beach Harbor, and evaluation of all viable alternatives with full consideration of engineering, economic, environmental, social and other aspects in the overall public interest, I recommend that the existing project at Long Beach Harbor, authorized by the 1871 Rivers and Harbors Act, as amended, be modified to provide for deepening, extending and maintaining deep draft navigation access, entrance and main channels and turning basins in Long Beach Harbor to a depth of -76 feet MLLW in accordance with the plan selected herein and in accordance with Section 201(b) of the Water Resources Development Act of 1986 (Public Law 99-662) as amended. The Recommended Plan includes channel deepening work inside the Long Beach Beakwater recently completed by the Port of Long Beach, and new work to extend and deepen the approach and entrance channel to Long Beach Harbor. The total cost of the Recommended Plan (completed work and uncompleted work) is estimated to be $55,449,000 (October 1995 price levels), which includes an estimate of the cost of the work completed by the Port of Long Beach based on an estimate of the cost of this work had it been performed by the Corps of Engineers as part constructing the entire Recommended Plan.

I recommend that the cost of the uncompleted portion of the Recommended Plan, currently estimated at $37,288,000 (October 1995 price levels), be cost-shared in accordance with the provisions of Section 101 of WRDA 86. Accordingly, the Federal share would be $7,017,000 and the non-Federal share $30,271,000. By incorporating the crediting provisions of Section 4 of WRDA 88, the non-Federal share would be reduced by $7,300,500 which represents the credit due them for work already completed under the Pier J Expansion Project. Thus, the Federal share is increased to $14,317,500, and the non-Federal share is reduced to $22,970,500.

The basis of the Federal credit allowed to the Port of Long Beach is the lesser of the estimated Federal cost of the work had it been completed by the Corps of Engineers or the actual costs that are auditable, allowable, and allocable as a portion of the Federal cost. Port of Long Beach costs eligible for crediting include actual construction costs; continued planning, engineering, and design costs incurred after project authorization; costs of relocation of highway and railroad bridges; supervision and administrative cost; inspection and auditing costs; and, costs of contract dispute settlements or awards. Eligible costs do not include the value of lands, easements, rights-of-way, and dredged material disposal areas, relocations, dredging of non-Federal public or private channels and berthing areas, and aides to navigation. The final allowable credit amount will be subject to an audit of the actual cost incurred by the Port in constructing the completed portion of the Recommended Plan; such audit to be performed prior to execution of the Project Cooperation Agreement (PCA).

This recommendation is made with the provision that prior to implementation, non-Federal interests will, in accordance with the general requirements of law for this type of project, agree to comply with the following requirements:

a. Pay during the period of construction 50 percent of the cost of construction of the uncompleted portion of the general navigation features of the Recommended Plan minus the estimated $7,300,500 credit, determined to be the Federal share of the portion of the general navigation features (GNF) of the Recommended Plan already completed by the Port of Long Beach;

b. Pay with interest over a period not to exceed 30 years following completion of construction an additional 10 percent of the total cost of construction of the general navigation features of the Recommended Plan, the interest to be determined pursuant to Section 106 of Public Law 99-662. The value of lands, easements, rights-of-way, relocations (other than utility relocations), and borrow and dredged or excavated material disposal areas and costs of utility relocations borne by the sponsor for the Recommended plan ($60,000) shall be credited toward this required payment, for a total local sponsor payment of $1,652,000, to be paid over 30 years;

c. Pay 100 percent of any actual construction costs of general navigation features that are in excess of the Government estimate of the costs of general navigation features of the NED plan;

d. Provide all lands, easements, and rights-of way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of the project;

e. Provide or pay the cost of providing all retaining dikes, wasteweirs, bulkheads,, and embankments, including monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of the project;

f. Hold and save the United States free from all damages due to the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors;

g. Assume responsibility for construction and installation of all non-Federal project features of the Recommended Plan, concurrent with construction of Federal project general navigation features of the Recommended Plan including additional pump capacity and storage tank facilities;

h. Provide and maintain adequate public terminal and transfer facilities open to all on equal terms and with such depths from the Federal channel line to and between the wharves at the terminal (berthing areas) as may be required for accommodation of vessels, consistent with the Federal project;

i. Prohibit erection of any structures or berthing of any vessels that would encroach on the authorized general navigation features;

j. Perform prior to initiation of construction, and thereafter as determined necessary,environmental investigations to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, in or under all lands, easements and rights of way necessary for construction, operation, and maintenance of the project;

k. Assume complete financial responsibility for cleanup and response costs of any CERCLA regulated materials located in, on or under lands, easements, or rights of way necessary for the construction, operation, and maintenance of the project; and be responsible for operating, maintaining, repairing, replacing, and rehabilitating the project in a manner so that liability will not arise under CERCLA;

l. Pay one-half of the excess of the cost of operation and maintenance of the general navigation features of the project over the cost of which the Government determines would be incurred for operation and maintenance if the project had a depth of 45 feet below mean lower low water (MLLW);

m. Provide, operate, maintain, repair, replace,, and rehabilitate, at its own expense, all project features other than those for general navigation;

n. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project;

o. Keep, and maintain, books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs;

p. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CRF Part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

q. Comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500,II issued pursuant thereto and published in Part 300 of Title 32, case of Federal Regulations, as well as Army Regulation 66-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army, " and

r. Ensure that lands created by the project are retained in public ownership for uses compatible with the authorized purposes of the project, and regulate the use, growth, and development on such lands to those industries whose activities are dependent upon water transportation.

The Plan is recommended with such further modifications thereto as in the discretion of the Chief of Engineers may be advisable.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch.

MICHAL R. ROBINSON
Colonel, Corps of Engineers
District Engineer

[First Endorsement]

CESPD-PD-P (September 1995) (1105)
Sloan/ef/705-1474
SUBJECT: Feasibility Report for Deep-Draft Navigation Improvements, Port of Long Beach Main Channel Deepening, San Pedro Bay, California

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 720, San Francisco, CA 94111-2206 14 Nov 1995

FOR CDR USACE (CECW-AR), 7701 Telegraph Road, Alexandria, VA 22315-3861

I concur in the conclusions and recommendations of the District Commander.

Bruce K. Scott
BRUCE K. SCOTT
Brigadier General, U.S. Army
Commanding

FINAL
ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT

Proposed Port of Long Beach Channel Deepening Plan
Los Angeles County, California

The Federal Lead Agency for National Environmental Policy Act (NEPA) compliance is the U.S. Army Corps of Engineers, Los Angeles District. The State Lead Agency for California Environmental Quality Act (CEQA) compliance is the Port of Long Beach.

Abstract: The proposed action is a modification of the existing federal navigation project at Long Beach Harbor to allow large crude petroleum tankers to more fully utilize their capacities, thereby improving efficiency and reducing transportation costs. It involves deepening the approach channel outside the Queen's Gate entrance to the Port of Long Beach (POLB) from 60 feet below mean lower low water (MLLW) to 76 feet below MLLW to allow vessels to enter the harbor fully loaded. A number of alternatives to the proposed action were initially considered in addition to dredging, the use of monobuoys or lightering, as well as the use of other ports. Analysis of alternative dredge and disposal scenarios determined the proposed action to maximize its net positive contributions to the goal of National Economic Development.

THE OFFICIAL CLOSING DATE FOR RECEIPT OF COMMENTS IS 30 DAYS FROM THE DATE ON WHICH THE NOTICE OF AVAILABILITY OF THIS FINAL EIS/EIR APPEARS IN THE FEDERAL REGISTER.

If you would like further information of this statement, please contact:
Mr. Russell L. Kaiser
Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053
Telephone: 213-894-0247
FAX: 213-894-5312

ERRATA SHEET

CLARIFICATION OF TERMINOLOGY:

For the purposes of this EIS/EIR and associated Feasibility Study, the "Recommended Plan" (completed and uncompleted work) consists of dredging the approach, entrance, and main channel into the Port of Long Beach to Berth 121 to a depth of -76 feet MLW, with placement of material as described in this document.

The portion of the channel which is located inside the breakwater, and which has already been dredged by the Port of Long Beach to a depth of -76 feet MLW as part of the Pier J expansion efforts is referred to as "the completed portion of the Recommended Plan". These efforts have already been covered by previous environmental documents, and is not covered within this EIS/EIR.

That portion of the channel which is located outside the breakwater, as well as the small area just inside Queen's Gate, that was NOT dredged as part of the Pier J expansion efforts is referred to as the "uncompleted portion of the Recommended Plan". This EIS/EIR covers ONLY the uncompleted portion of the Recommended Plan, and is heretofore referred to within this document as "the proposed action".

REGULATORY COMPLIANCE INFORMATION:

Additional information on project compliance with applicable environmental laws and regulations is provided in Appendix B, Regulatory Framework.

COMMENTS/RESPONSES TO LETTERS RECEIVED DURING PUBLIC REVIEW:

Seven comment letters were received on the draft EIS/EIR. The following section summarizes the interested party/agency, comment, and response to comment.

California Regional Water Quality Control Board; letter dated Jul 26, 1995:

COMMENT: The Regional Board favors beneficial reuse of the dredge material.

RESPONSE: Beneficial uses of dredge material considered in the Feasibility Report include use for beach nourishment, environmental restoration, and landfills. Material was found not to be suitable for beach nourishment purposes. Suitable material will be used for the Port of Los Angeles landfill, with remaining material going into the Energy Island borrow pits. This material will then be available for a variety of beneficial uses.

COMMENT: Long-term needs for landfill material should be factored into the planning process for dredge material disposal.

RESPONSE: Use of the dredge material for landfill needs was factored into the disposal planning process to the extent such needs were known. Suitable material is planned for disposal at the Port of Los Angeles landfills. Disposal of the material into the borrow pits does not preclude retrieval of this material for future landfill purposes if desired.

COMMENT: Disposal of dredged material into the borrow pits should be evaluated as part of a Regional Sediment Management Strategy, which would determined whether the pits should be utilized for disposal of clean material, or contaminated material.

RESPONSE: Development of a Regional Sediment Management Strategy would provide a valuable long-range planning tool for sediment disposal purposes. Most of the capacity in the largest borrow pit is being reserved for future use as determined in such a strategy, and the material from this project disposed in the other borrow pits could be retrieved and re-allocated in the future pending regional strategy recommendations. However, the non-Federal sponsor and the City of Long Beach do not support use of these pits for regional purposes at this time.

U.S. Environmental Protection Agency, letter dated July 27, 1995:

COMMENT: Suggest that Final EIS include a discussion of utilizing a suitable portion of the dredged material as a cap for the Los Angeles River borrow pit. Suggest the proper hierarchy for disposal in the pits should be the Los Angeles River borrow pit, the Long Beach Main Channel pit, and then the Southeast Energy Island pit.

RESPONSE: As discussed in Section 3.2.3.3, the Los Angeles River Mouth pit (LARMP) was screened as an alternative. This pit has been historically used for emergency dredge activities from the Los Angeles River, near the Golden Shores Landing Entrance. In March 1995, approximately 600,000 cubic yards of material were placed in this pit. Following, the pit was capped with material from Pier J construction efforts, roughly 175,000 cubic yards of material were placed in the pit. As shown in Table 3-1, the pit capacity is about 1 million cubic yards (mcy).

If additional material is placed in the LARMP from this project, pit disposal requirements will then require material placement at four sites instead of three, because of the low volume available. If the LARMP is used, additional site impacts would be created and associated with water quality, air, and noise. Safety impacts would also be raised as an issue as part of the Los Angeles River channel would be closed during construction, altering ship traffic patterns and generating potential congestion. Additional cumulative impacts would also be likely to affect local marine life. Because of the limited capacity and the additional associated impacts, the Corps has determined that the other pits (i.e., Main Channel Pit and Energy Island pits) are more feasible and are of a higher ranking than the Los Angeles River pit. The recommended (or preferred) plan is to transport 2.0 mcy to the POLA for Pier 400 efforts, and to place 2.1 mcy of material in the Main Channel Pit and 1.5 mcy in the Energy Island Southeast Pit.

The LARMP is thus being saved for future emergency actions associated with the Golden Shores Landing Entrance near the Los Angeles River mouth.

COMMENT: The DEIS does not appear to specifically address the requirements of EO12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations.

RESPONSE: The Final EIS/EIR has been modified to address the requirements of EO12898. It has been determined that the proposed project will not have a significant, adverse impact on Minority or Low Income populations.

National Marine Fisheries Service; letter dated June 19, 1995

COMMENT: Recommend updating Section 4.3.1 - Commercial Fishing - to reflect California commercial fishing regulations relating to the use of set nets since the passage of Proposition 132.

RESPONSE: This section has been updated in accordance with these regulations.

U.S. Fish and Wildlife Service; Draft Coordination Act Report dated September 13, 1995

RECOMMENDATION #1: Recommend the Corps follow the recommendations of the Interagency Working Group on the Dredging Process, especially with respect to the need for a regional sediment management strategy.

RESPONSE: The Corps will continue to work with local entities and interested agencies in the development of a regional sediment management strategy. The disposal plan for the proposed action was developed in coordination with all interests, and is considered acceptable at this time.

RECOMMENDATION #2: Recommend the Corps restrict the discharge of dredged material to the period November 16 to March 15, to eliminate conflicts with the California least tern and reduce conflicts with the California brown pelican.

RESPONSE: As mentioned in Section 3.4.2 (DEIS/DEIR), construction is expected to take between 16 and 22 months. If construction were to be scheduled to occur between November 15 and March 15, this would increase dredging operations to approximately 4 to 5 years. A 4 to 5 year dredging schedule is not feasible from a safety or an environmental position, nor is it economically justified.

Additional safety concerns would be raised on two levels: 1) The recommended season (fall/winter) would require dredging operations to occur over a 4 to 5 year window, as compared to the proposed project's schedule of 2 years. The recommended construction season proposed above also coincides with the natural time of year when storms are more prevalent. Because operations will be occurring outside the breakwater, there will be a greater probability over the 4 to 5 year window for construction crews to be subject to bad weather: high winds and stormy seas. Although the proposed project's schedule will also expose workers to this period, it will be minimized to only 2 potential stormy seasons. 2) Constraints to navigation would continue to force vessels to operate inefficiently into and out the Port. Currently, limiting channel depths require shippers to use large vessels that are light-loaded and ride the tides into the port or use more, but smaller vessels to transport the same amount of product. Because more vessels are required to transport the material under the No Action as compared to the Proposed Action, there is also a greater risk for vessel congestion to occur in the port. Therefore, increased safety benefits would be lost under this recommendation.

If the project is completed over a 4 to 5 year period as recommended, other benefits would be lost, including air quality improvements (Section 4.4 of DEIS/DEIR). Other negative impacts would include water quality, marine, noise, land/water use, safety (increased risk of accidents, oil spills, etc...), and aesthetic impacts cumulatively over the 5 year construction life as compared to the proposed 2 year life.

Additional costs would also be incurred by implementing the plan recommended above. As construction would occur seasonally, there would be additional costs associated with each equipment mobilization and demobilization each season. Under the proposed project, larger vessels could likely use the deepened channel upon project completion, about 16 to 22 months. Under the longer construction scenario, larger vessels would not be able to utilize the deepened channel until year 5, resulting in relative economic losses over the interim period.

As discussed in the FEIS/FEIR, safety, air quality (and other environmental factors), as well as economic considerations are the primary reasons for constructing this project. Under this recommendation, greater safety risks, environmental impacts, and economic costs would occur. For these reasons, this recommendation is not considered feasible for implementation.

RECOMMENDATION #3: If the Corps cannot conduct the project within the time frame stipulated above, recommend the use of silt curtains and other measures as needed to reduce the turbidity plume at the point of dredge material disposal.

RESPONSE: As detailed in the DEIS/DEIR (Sections 4.3/6), turbidity issues are closely associated to the foraging habits of the least tern. Approximately 80 percent of least tern foraging activities occur in waters less than 20 to 30 feet in depth and within approximately 3 miles of the nest site (FWS, PAL, 1994). Foraging activities have been sited to occur to a lesser extent up to five miles of the colony. As shown on Figure 4.3-1 (DEIS/DEIR), the Main Channel pit is located within 3 miles of the nearest nest site; it also has a bottom elevation of 90 feet below mean lower low water (MLLW) (Table 3.1 of DEIS/DEIR).

This pit's elevation will be raised to match the existing channel elevation, which is approximately 80 feet below MLLW. (This area is also a high use area and heavily influenced by boat traffic.) For these reasons, this pit (or the immediate neighboring area) is not expected to see use by least tern foraging purposes. The Energy Island pit has a bottom elevation of about 60 feet below MLLW and will be raised to an ambient bathymetric elevation of roughly 30 feet below MLLW (Table 3.1 of DEIS/DEIR); this pit is located about 4.5 miles from the nearest colony site (Figure 4.3-1 of DEIS/DEIR). Accordingly, based on the information provided in the Planning Aid Letter (FWS, 1994), it is not likely that tern foraging will occur near the Energy Island pit. For these reasons, it has been determined that least tern foraging activities in the vicinity of either borrow pits is not likely to occur.

Although least tern foraging is not likely to occur in the vicinity of the disposal pits, the Corps has carefully considered additional practicable measures to minimize turbidity and sedimentation impacts (Sections 4.2.3/4.3.3 of DEIS/DEIR). The Corps has considered using silt curtains to help minimize project induced turbidity. Based on other project observations and modeling projections of existing conditions, turbidity will be expected to be localized to the immediate area and will settle rapidly (within hours) of cessation of disposal activities; the Corps has also determined that due to the difficulty in stabilizing silt curtains in an oceanographic environment, they will not perform as anticipated in this case in reducing turbidity effects. Based on our analyses, the Corps will: weir off sediment slurry at the dredge site, place material quickly at the disposal site so materials fall as a mass, and implement scheduling constraints, if necessary. If possible, project construction will be initiated between early June and August, which will minimize overall effects by permitting work to proceed only through one least tern breeding season. If this is not possible, it is still possible to minimize any potential impacts on least tern foraging. The strategy in this case would entail avoiding use of the Energy Island pit during the least tern season, using other placement sites during that period, then returning the Energy Island pit during a time of the year when the least terns are not a concern.

By incorporating the proposed scheduling constraints and material placement techniques, we believe in the spirit of this recommendation we have fully evaluated all practicable alternatives and have incorporated those measures determined to be cost effective as a part of the recommended plan. Hence, the Corps has determined the recommended plan will avoid and/or minimize project impacts to the maximum extent practicable and will not have an effect nor jeopardize the continued existence of any federally listed threatened or endangered species. Formal consultation pursuant to Section 7 of the Endangered Species Act is not required for project implementation.

RECOMMENDATION #4: Recommend the Corps reduce noise and disturbance during dredging and disposal activities.

RESPONSE: There are no anticipated significant adverse impacts associated with noise and disturbance from construction activities due to the existing level of vessel traffic in the area. The Corps will continue to work with the Service to resolve these concerns as well..

RECOMMENDATION #5: We recommend that the Corps monitor possible movement and dispersal of contaminants and pit water from the proposed disposal areas into adjacent areas outside the pits after the placement of dredge material. The cost of this recommendation depends upon the scale of the sampling effort and the vessel used. Current cost of analysis for organochlorines, PCBs, organophosphates, hydrocarbons, butyltins, and grain size is about $1,500/sample.

RESPONSE: As discussed in Sections 4.2/4.3 (of the DEIS/DEIR), sediment sampling conducted in the borrow pits did not reveal the presence of contaminants at concentrations that would cause concern.

If, however, the pits do contain low-oxygen water the probability that disposal operations would adversely affect the adjacent fish and benthos is remote due to the short length of time over which disposal would occur: each disposal episode would displace a relatively small volume of water that would be quickly dispersed by the tidal currents. It is anticipated that dispersal of displaced water and sediments during disposal operations will be so rapid that a monitoring effort is not likely to generate any useful data. A good analogy is the early efforts to detect the effects of power plant intakes on the abundance of zooplankton: the rapid dispersal and high spatial variability of oceanic environments meant that researchers could only detect statistically meaningful differences through enormously expensive, intensive sampling efforts. Therefore, such a monitoring program is not considered feasible for implementation.

California Department of Transportation; letter dated July 20, 1995:

COMMENT: Any transport of heavy construction equipment requiring the use of oversize transport vehicles on State highways, freeways will require a Caltrans transportation permit. Recommend limiting large size trucks carrying construction materials to off-peak hours.

RESPONSE: A Caltrans transportation permit will be obtained under the above scenario. If possible, construction traffic will attempt to operate in a manner to minimize overall impacts.

COMMENT LETTERS RECEIVED ON

DRAFT EIS/EIR

STATE OF CALIFORNIA—ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
1 CENTRE PLAZA DRIVE
ONTEREY PARK, CA 91754-2156
(213) 266-7500
FAX: (213) 266-7600

July 26, 1995

Mr. Russell Kaiser
U.S. Army Corps of Engineers
P.O. Box 2711
Los Angeles, CA 90053-2325

PORT OF LONG BEACH MAIN CHANNEL DEEPENING
DRAFT ENVIRONMENTAL IMPACT STATEMENT/IMPACT REPORT/FEASIBILITY STUDY

We have reviewed the subject documents and have a number of comments. Our primary concern pertains to the need to evaluate the dredged material disposal options for this project within the context of development of a Regional Sediment Management Strategy. Continuing to evaluate the disposal needs of projects on a piecemeal basis is inefficient and ineffective, particularly for a major project such as the channel deepening which will require disposal of approximately 5.6 million cubic yards via a combination of several disposal options.

Although the Draft EIS/EIR briefly discusses a range of different disposal options, it is deficient in that it does not discuss the cumulative impacts associated with other planned projects and maintenance dredging operations which can be expected to occur over the next several years. We recommend that the U.S. Army Corps of Engineers initiate the planning process required to examine these issues, for example by forming a task force of interested agencies to develop regional disposal options to deal with this ongoing sediment management problem.

We have the following comments pertaining to the disposal options identified in the Draft EIS/EIR as the "Recommended Plan":

1) The Regional Board favors beneficial reuse of the dredged material to the greatest extent practicable.

2) We would not object to the reuse of dredged material within the Port of Los Angeles' Pier 400 landfill or another fill site within the Port of Los Angeles or Long Beach, provided that the material is properly contained. Although the Port of Long Beach has indicated no current plans for using such material, it appears that a future need for fill material could exist, e.g., to offset subsidence and permit development of the UPRC parcel. Long-term needs should be identified and factored into the planning process.

3) We believe that disposal of dredged material within existing borrow pits should be evaluated as one potential component of a Regional Sediment Management Strategy. It is unclear whether such borrow pits should be filled at all, and if so, whether they should be filled with clean material or used to create a confined aquatic disposal site for contaminated material.

Until these issues have been resolved, it would be unwise to limit our future options by proceeding with the proposed disposal of 2.1 million cubic yards in the deepened borrow pit area of the Main Channel and 1.5 million cubic yards in the borrow pit near the Southeast Energy Island. Until a regional strategy has been developed, we would object to using these borrow pits as disposal sites.

4) We would not object to ocean disposal of dredged material at the offshore LA-2 site.

5) We would not object to the reuse of suitable dredged material (i.e., sand) for beach nourishment; however, it appears that most of the material to be dredged would not have acceptable grain size characteristics for this use.

6) We believe that the use of dredged material as daily cover for landfills should be investigated as one potential component of a Regional Sediment Strategy. However, as noted in the document, adverse water quality impacts associated with the high chloride levels of the sediments may restrict or prevent this type of use.

Should you have any questions, please contact me at (213) 266-7616.

J. MICHAEL LYONS
Chief, Surveillance Unit

cc: Jon Amdur, U.S. Environmental Protection Agency, Region IX
James Raives, California Coastal Commission, San Francisco
State Clearinghouse, Sacramento

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2711
LOS ANGELES, CALIFORNIA 90053-2325

June 6, 1995

REPLY TO
ATTENTION OF:

Office of the Chief
Environmental Resources Branch

Director, State of California
Regional Water Quality Control Board
Los Angeles Region
Attn: Mr. Michael Lyons
101 Centre Plaza Drive
Monterey Park, California 91754

Dear Sir:

I am pleased to provide you a copy of the U. S. Army Corps of Engineers' Port of Long Beach Deep Draft Navigation Draft Feasibility Study and Draft Environmental Impact Statement/Report (EIS/R). This report presents the results of the study and the impacts associated with the proposed recommended plan for Federal improvements to the Port of Long Beach.

The plan will involve dredging approximately 5.6 million cubic yards of material from the Long Beach Approach Channel. The area to be dredged is roughly 1,200 feet wide and extends from the Queens Gate seaward about 11,000 feet. The completed channel depth will be approximately 76 feet below mean lower low water (MLLW). The dredged material will be placed in two man-made pits in the floor of the outer harbor at depths ranging from -90 feet MLLW to -30 feet MLLW, and in a landfill at the Port of Los Angeles Pier 400 project. The plan is not expected to cause any significant adverse impacts to the environment other than a short term impact to Air Quality during construction. However, long term improvements to Air Quality will result from fewer vessel trips. The recommended plan will achieve more efficient use of the Port by allowing deep draft tanker vessels to enter fully loaded.

The total first cost to construct the plan is about $37,288,000. The federal share of the first cost is about $14,307,500, and this includes about $9,050,000 of credit to the local sponsor for work completed that is consistent with the Recommended Plan. The non-Federal share is about $22,980,500. The Port would also be required to reimburse the Federal Government $1,662,000 after construction and provide other requirements outlined in the report recommendation. The average annual equivalent benefits are estimated at approximately $34,685,000 as a result of reduced transportation costs. The plan is economically justified with average annual net benefits of $31,509,000 and a benefit to cost ratio of 10.9 to 1.

I also invite you to attend the public meeting on the study and recommended plan, scheduled for June 29, 1995, at 7:00 p.m., in the Board Hearing Room at the Port of Long Beach Administration Building located at 925 Harbor Plaza, in Long Beach, California. A copy of the public notice is also enclosed.

This letter and the enclosed EIS/R satisfy the requirements of the Clean Water Act to request Section 401 Water Quality Certification, pursuant to 33CFR336.1(a)(1).

Section 404(t) of the Clean Water Act authorizes or requires the Corps to comply with the State or Regional Boards' substantive and procedural requirements pertaining to the discharge of dredged or fill material. However, this Section does not authorize the payment of fees as a condition of compliance with these requirements. Fundamentally, it is our position that the Federal Government is only authorized to pay fees where Congress has clearly and unambiguously waived Federal supremacy.

Please respond with comments on the Main Report and EIS/R within 45 days of receipt of this letter. If your office does not respond within that time frame, we will consider this project to be in full compliance with the Clean Water Act. Correspondence may be sent to:

Mr. Robert S. Joe
Chief, Planning Division
U.S. Army Corps of Engineers
Attn: CESPL-PD-RN, Mr. Russell L. Kaiser
P.O. Box 2711
Los Angeles, California 90053-2325

If you have any questions regarding this project, please contact Messrs. Russell L. Kaiser, Environmental Manager, at (213) 894-0247, or Bruce M. Williams, Feasibility Study Manager, at (213) 894-4206. Thank you for your review and comments.

Sincerely,

Robert S. Joe
Chief, Planning Division

Enclosure

39-785 97 - 6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

July 27, 1995

Mr. Robert S. Joe
Chief, Planning Division
U.S. Army Corps of Engineers
ATTN: CESPL-PD-RN, Mr. Russell Kaiser
P.O. Box 2711
Los Angeles, CA 90053-2325

Dear Mr. Joe

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the project entitled **Port of Long Beach, Main Channel Deepening.** Our review is provided pursuant to the National Environmental Policy Act (NEPA) [42 USC 4231 et seq.], Council on Environmental Quality (CEQ) regulations [40 CFR 1500-1508] and Section 309 of the Clean Air Act.

The Corps of Engineers and the Port of Long Beach propose to dredge approximately 5.6 million cubic yards of material from the Long Beach Approach Channel. The area to be dredged is roughly 1,200 feet wide and extends from the Queens Gate seaward about 11,000 feet. The dredged material will be placed in two man-made pits in the floor of the outer harbor. The purpose of the project is to achieve more efficient use of the Port by allowing deep draft tanker vessels to enter fully loaded.

Based on our overall review, we have assigned the DEIS a rating of **LO (Lack of Objections)**. This LO Rating is defined in the attached "Summary of the EPA Rating System." While we have assigned the LO rating we do have two recommendations for the Corps of Engineers (COE): 1) that the Final EIS address the requirements of Executive Order 12898, **Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations**, and 2) that the Final EIS include a modified alternative in which dredged material would be used to cap material in the Los Angeles River Borrow Pit. Our detailed comments are below.

PLACEMENT ALTERNATIVES

EPA supports the Corps of Engineers' determination that Alternative A is the most environmentally acceptable and cost effective placement alternative presented in the DEIS. However, we suggest that the Final EIS include discussion of a slightly modified version of Alternative A in which a suitable portion of dredged sediment would be used for additional cap material in the

Los Angeles River Borrow Pit. This cap material may be required to adequately cap dredged material unsuitable for unrestricted disposal placed into the pit by the COE under emergency authorization. Although only a small volume of material may be needed to complete the cap, if placement can be completed with negligible additional costs, placement of material as cap for the contaminated material from the Los Angeles River may have greater environmental benefits than the other disposal alternatives analyzed.

EPA believes that the appropriate placement hierarchy for this project would be to place the finer grain portions of the project into the Los Angeles River Borrow Pit, Long Beach Main Channel Pit, and finally the Southeast Energy Island Pit. The FEIS should discuss this proposed hierarchy and describe how some sand should also be allocated to armor (final cap) the L.A River borrow pit. Additional material suitable for construction should go to the Port of Los Angeles Pier 400 placement site. The discussion of this modified alternative should describe the potential region wide environmental benefits of such an alternative.

EXECUTIVE ORDER (EO) 12898:

The DEIS does not appear to specifically address the requirements of EO 12898, **Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** (Federal Register, February 16, 1995, p. 7629). The EO provides that Federal agencies should fully analyze the environmental impacts of their actions on minority and low-income communities. We suggest that the FEIS address the applicability of the EO to the proposed project.

We appreciate the opportunity to review and provide comments on the DEIS. Please send one copy of the Final EIS to this office at the same time it is officially filed with our Washington, D.C. office. If you have any questions, please contact me at (415) 744-1584, or have your staff contact Edward Yates at 744-1571.

Sincerely,

David Farrel, Chief
Office of Federal Activities

MI# 2328: QUGATE.DEI

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommend for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

EFB
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213
TEL (310) 980-4000; FAX (310) 980-4018

JUN 19 1995

Mr. Robert S. Joe
Chief, Planning Division
U.S. Army Corps of Engineers
Attn: CESPL-PD-RN, Mr. Russel L. Kaiser
P.O. Box 2711
Los Angeles, California 90053-2325

Dear Mr. Joe:

The National Marine Fisheries Service (NMFS) appreciates this opportunity to review the "Port of Long Beach Deep Draft Navigation Draft Feasibility Study and Draft Environmental Impact Statement/Report (EIS/R)." During the period when these documents were being prepared, NMFS had extensive coordination with your office and the Port of Long Beach to finalize the design of the deep draft navigation project. Because of that coordination we now believe the project is environmentally sound.

For the sake of technical accuracy, the only changes we would recommend are to Section 4.3.1 - Commercial Fishing in the DEIR. That segment needs to be updated since it does not accurately reflect California commercial fishing regulations relating to the use of set nets since the passage of Proposition 132.

If you have any questions regarding these comments, please contact Mr. Jim Slawson at (310) 980-4044.

Sincerely,

for JJ Slawson
Hilda Diaz-Soltero
Regional Director

STATE OF CALIFORNIA—BUSINESS AND TRANSPORTATION AGENCY PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, 120 SO. SPRING ST.
LOS ANGELES, CA 90012-3606
TDD (213) 897-6610

July 20, 1995

IGR/CEQA/Draft Environmental
Statement/EIS
PORT OF LONG BEACH MAIN
CHANNEL WIDENING
Vic. LA-710-6.80
SCH #95064017

Mr. Russell Kaiser
U.S. Army Corps of Engineers
P.O. Box 2711
Los Angeles, CA 90053-2325

Dear Mr. Kaiser:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above-referenced document. The plan will involve dredging approximately 5.6 million cubic yards of material from the Long Beach Approach Channel. The area to be dredged is roughly 1,200 feet wide and extends from the Queens Gate seaward about 11,000 feet.

Any transport of heavy construction equipment which requires the use of oversize transport vehicles on State Freeways/Highways will require a Caltrans transportation permit. We recommend that large size trucks that are transporting construction materials, and equipment, be limited to off-peak commute periods.

If you have any questions regarding this response, please call me at (213) 897-4429.

Sincerely,

Steve Buswell

STEVE BUSWELL
IGR/CEQA Coordinator
Transportation Planning Office

cc: Nadell Gayou
Department of Water Resources
1020 Ninth Street, Third Floor
Sacramento, CA 95814

cc: Mark Goss
State Clearinghouse

nh\6067

The Resources Agency

Pete Wilson
Governor

Douglas P. Wheeler
Secretary

of California

California Conservation Corps • Department of Boating & Waterways • Department of Conservation
Department of Fish & Game • Department of Forestry & Fire Protection • Department of Parks & Recreation • Department of Water Resources

August 1, 1995

Colonel Michal R. Robinson
U. S. Army Corps of Engineers
ATTN: Mr. Russell Kaiser
P. O. Box 2711
Los Angeles, California 90053-2325

Dear Mr. Kaiser:

The State has reviewed the Draft Environmental Impact Statement, Port of Long Beach Main Channel Deepening, Los Angeles County, submitted through the Office of Planning and Research.

We coordinated review of this document with the California Coastal, and State Lands Commissions; the Air Resources, Integrated Waste Management, and Los Angeles Regional Water Quality Control Boards; and the Departments of Boating and Waterways, Conservation, Fish and Game, and Transportation.

The Department of Transportation replied directly by copy of their correspondence dated July 20, 1995. The California Coastal Commission states that they are still reviewing this project.

Thank you for providing an opportunity to review this project.

Sincerely,

for James T. Burroughs
Deputy Secretary and General Counsel

cc: Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814
(SCH 95064017)

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

October 12, 1995

Robert S. Joe
Chief, Planning Division
U.S. Army Corps of Engineers
ATTN: Russ Kaiser
P.O. Box 2711
Los Angeles, CA 90053-2325

Subject: Consistency Determination CD-54-95 (Queens Gate Entrance Channel Deepening, Port of Long Beach, Los Angeles County)

Dear Mr. Joe:

On September 13, 1995, by a vote of twelve in favor and none opposed, the California Coastal Commission concurred with the above-referenced consistency determination for entrance channel deepening at and seaward of the Port of Long Beach in Los Angeles County. The Commission found the project consistent with the California Coastal Management Program.

Sincerely,

LARRY SIMON

Larry Simon
Staff Analyst

cc: South Coast Area Office
NOAA
OCRM
Governor's Washington, D.C., Office
California Department of Water Resources
Port of Long Beach

6454p

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

CALIFORNIA COASTAL COMMISSION
4' FREMONT, SUITE 2000
FRANCISCO, CA 94105-2219
.E AND TDD (415) 904-5200

W13a

STAFF REPORT AND RECOMMENDATION

ON CONSISTENCY DETERMINATION

Consistency Determination
No. CD-54-95
Staff: LJS-SF
File Date: June 12, 1995
45th Day: July 27, 1995
60th Day: Extended to Sept. 15, 1995
Commission Meeting: Sept. 13, 1995

FEDERAL AGENCY: U.S. Army Corps of Engineers

DEVELOPMENT LOCATION: Long Beach Approach Channel (seaward of the Long Beach Breakwater), Port of Los Angeles, Port of Long Beach, and offshore of the City of Long Beach, Los Angeles County (Exhibit 1).

DEVELOPMENT DESCRIPTION: Dredging 5.6 million cubic yards of material to deepen the Long Beach Approach Channel to -76 feet, and disposal of dredged material at the Port of Los Angeles Pier 400 landfill (2.0 million c.y.), a deep water trench in the Long Beach Main Channel (2.1 million c.y.), and a borrow pit southeast of Energy Island White offshore of the City of Long Beach (1.5 million c.y.).

SUBSTANTIVE FILE DOCUMENTS:

1. Port of Long Beach Port Master Plan (as amended through September 1995).
2. Port of Los Angeles Port Master Plan (as amended through August 1995).

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers has submitted a consistency determination for deepening to -76 feet mean lower low water the 14,000-foot-long approach channel to the Port of Long Beach. The deepening of the approach channel is necessary to allow fully-loaded, deep-draft tankers to enter the Port and dock at the liquid bulk terminal at Berth 121. The Corps proposes to dredge approximately 5.6 million cubic yards (c.y.) of material and dispose the sediments at three locations: (1) the Port of Los Angeles Pier 400 landfill (2.0 million c.y.), (2) a deep water trench in the Long Beach Main Channel

(2.1 million c.y.), and (3) a borrow pit southeast of Energy Island White offshore of the City of Long Beach (1.5 million c.y.). The dredged material is clean and suitable for ocean disposal but is too fine-grained to be used for beach replenishment. The proposed dredging and disposal is consistent with the marine resources policies (Sections 30230, 30233, 30705, 30706, and 30708) and the commercial and recreational fishing policies (Sections 30224 and 30234) of the Coastal Act.

STAFF NOTE:

This consistency determination calls for disposal of dredged materials at three distinct sites in the Port of Los Angeles, Port of Long Beach, and southeast of Energy Island White. The Corps of Engineers has committed that should there be any change in disposal locations subsequent to Commission action on this consistency determination but prior to commencement of dredging in 1997, the Corps will submit a revised consistency determination for the new disposal site(s) prior to commencement of dredging.

STAFF SUMMARY AND RECOMMENDATION:

I. Project Description. The Corps of Engineers proposes to deepen the 1,200-foot-wide Port of Long Beach main approach channel, located between the Queen's Gate breakwater entrance and a point approximately 14,000 feet seaward of the breakwater (Exhibits 1-3). Dredging would deepen the approach channel from its present depth of -60 feet mean lower low water (MLLW) to -76 feet MLLW and would allow fully-loaded, deep-draft liquid bulk tankers to enter the Port and deliver liquid products to Berth 121. Approximately 5.6 million cubic yards of material would be dredged from the 385-acre approach channel corridor during the 16 to 22 month-long, 24-hour-per-day construction period scheduled to commence in 1997. Dredged material will be disposed at three locations: (1) 2.0 million cubic yards (c.y.) at the Pier 400 landfill in the Port of Los Angeles; (2) 2.1 million c.y. in the deep water trench in the Port of Long Beach Main Channel; and (3) 1.5 million c.y. in the borrow pit southeast of Energy Island White offshore of the City of Long Beach. The sediments underwent full chemical and bioassay testing and are suitable for in-water disposal. The dredged material is not suitable for beach or nearshore disposal because of the fine-grained nature of the sediments.

II. Status of Local Coastal Program. The standard of review for federal consistency determinations is the policies of Chapters 3 and 8 of the Coastal Act, and not the Local Coastal Program (LCP) or Port Master Plan (PMP) of the affected area. If the LCP or PMP has been certified by the Commission and incorporated into the California Coastal Management Program (CCMP), it can provide guidance in applying Chapter 3 and 8 policies in light of local circumstances. If the LCP or PMP has not been incorporated into the CCMP, it cannot be used to guide the Commission's decision, but it can be used as background information. The Port of Long Beach PMP, the Port of Los Angeles PMP, and the City of Long Beach LCP have been certified by the Commission and incorporated into the CCMP.

III. Federal Agency's Consistency Determination. The Corps of Engineers has determined the project to be consistent to the maximum extent practicable with the California Coastal Management Program.

IV. Staff Recommendation:

The staff recommends that the Commission adopt the following resolution:

A. Concurrence.

The Commission hereby concurs with the consistency determination made by the Army Corps of Engineers for the proposed project, finding that the project is consistent to the maximum extent practicable with the California Coastal Management Program.

V. Findings and Declarations:

The Commission finds and declares as follows:

A. Dredging/Habitat/Marine Resources. The Coastal Act provides the following:

> 30230. Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.
>
> 30233.
> (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:
>
> (1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.
>
> ...
>
> (b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.
>
> 30705.
> (a) Water areas may be diked, filled, or dredged when consistent with a certified port master plan only for the following:

(1) Such construction, deepening, widening, lengthening, or maintenance of ship channel approaches, ship channels, turning basins, berthing areas, and facilities as are required for the safety and the accommodation of commerce and vessels to be served by port facilities.

(2) New or expanded facilities or waterfront land for port-related facilities.

...

(b) The design and location of new or expanded facilities shall, to the extent practicable, take advantage of existing water depths, water circulation, siltation patterns, and means available to reduce controllable sedimentation so as to diminish the need for future dredging.

(c) Dredging shall be planned, scheduled, and carried out to minimize disruption to fish and bird breeding and migrations, marine habitats, and water circulation. Bottom sediments or sediment elutriate shall be analyzed for toxicants prior to dredging or mining, and where water quality standards are met, dredge spoils may be deposited in open coastal water sites designated to minimize potential adverse impacts on marine organisms, or in confined coastal waters designated as fill sites by the master plan where such spoil can be isolated and contained, or in fill basins on upland sites. Dredge material shall not be transported from coastal waters into estuarine or fresh water areas for disposal.

(d) For water areas to be diked, filled, or dredged, the commission shall balance and consider socioeconomic and environmental factors.

30706. In addition to the other provisions of this chapter, the policies contained in this section shall govern filling seaward of the mean high tide line within the jurisdiction of ports:

(a) The water area to be filled shall be the minimum necessary to achieve the purpose of the fill.

(b) The nature, location, and extent of any fill, including the disposal of dredge spoils within an area designated for fill, shall minimize harmful effects to coastal resources, such as water quality, fish or wildlife resources, recreational resources, or sand transport systems, and shall minimize reductions of the volume, surface area, or circulation of water.

(c) The fill is constructed in accordance with sound safety standards which will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters.

(d) The fill is consistent with navigational safety.

30708. All port-related developments shall be located, designed, and constructed so as to:

(a) Minimize substantial adverse environmental impacts.

(b) Minimize potential traffic conflicts between vessels.

(c) Give highest priority to the use of existing land space within harbors for port purposes, including, but not limited to, navigational facilities, shipping industries, and necessary support and access facilities.

(d) Provide for other beneficial uses consistent with the public trust, including, but not limited to, recreation and wildlife habitat uses, to the extent feasible.

(e) Encourage rail service to port areas and multi-company use of facilities.

The proposed project involves dredging and filling in open and protected coastal waters outside the Long Beach Breakwater, offshore of the City of Long Beach, and within the Ports of Los Angeles and Long Beach. As a result, the project must pass the allowable use, alternatives, and mitigation tests of Section 30233 of the Coastal Act for those project components located outside port jusisdictional boundaries, and the allowable use and impact minimization policies of Sections 30705, 30706, and 30708 of the Coastal Act for those project components located within the ports.

The proposed dredging of open coastal waters to deepen the Long Beach Approach Channel is an allowable use under Section 30233(a)(1). The proposed disposal of dredged material in the deep water trench in the Long Beach Main Channel is an allowable use under Section 30705(a)(1). The proposed disposal of dredged material at the Pier 400 landfill site in the Port of Los Angeles is an allowable use under Section 30705(a)(2). The proposed disposal of dredged material in the borrow pit located southeast of Energy Island White is an allowable use under Section 30233(a)(1).

The Commission must next find that the proposed dredging is the least damaging feasible alternative. The dredging is necessary to support commercial navigation and to improve operating efficiencies at the liquid bulk terminal in the Port of Long Beach. The Long Beach Main Channel between the Queen's Gate entrance and Berth 121 was dredged to -76 feet MLLW as a part of the Pier J Expansion Landfill project in the early 1990s. However, fully-loaded, deep-draft tankers are prevented from entering the Port due to inadequate water depth in the approach channel. In order to reach the liquid bulk terminal at Berth 121, deep-draft tankers must transfer a portion of their cargo to a second vessel while outside the breakwater. The proposed project will eliminate this inefficiency and reduce the risk of oil spills and vessel collisions.

The Corps examined several alternatives to deepening the approach channel, including the continued, combined use of tides and tanker lightering, the use of other West coast ports, the use of other terminals in San Pedro Bay, and the use of offshore monobuoys. The Corps concluded that the only feasible and the least damaging alternative to meeting the project objective of improving the operating efficiency at the Port of Long Beach liquid bulk terminal at Berth 121 was to deepen the approach channel in combination with the continued use of tides. The Commission agrees with the Corps that the dredging alternatives are not feasible for environmental and engineering reasons, and that the proposed channel deepening is the least damaging alternative.

The Commission must next find that the proposed disposal of dredged material in the borrow pit southeast of Energy Island White is the least damaging feasible alternative, in combination with finding that disposal of dredged material at the two port locations (pier 400 in Los Angeles and the Main Channel in Long Beach) minimizes adverse environmental impacts. The Corps examined numerous disposal location alternatives prior to selecting the three proposed sites. The Corps first conducted grain size analyses of the proposed dredged material to determine its suitability for beach replenishment or placement in the nearshore zone. Originally, the Corps and the Port of Long Beach expected to find that the top layer of material to be dredged would be suitable for beach or nearshore placement along the Alamitos peninsula shoreline areas (Exhibit 4). Unfortunately, the mechanical analysis performed for the Corps by its contractor indicated that the material was too fine-grained to be placed on the beach and that it was also unsuitable for nearshore disposal. The proposed dredged material is comprised primarily of fine sands (with a grain size diameter less than 0.1 mm, and found in the top two million c.y. of dredged material) and silt. The Corps stated that:

> ...For the material to be compatible with the beaches along Alamitos Bay peninsula, the [grain size] diameters should be between 0.15 and 0.2 mm or somewhat coarser....If the material was placed on the beach, it can be expected that 25 to 50 percent of the material would be lost during dredging and placement operations....The placement of the finer material to restore beaches will change the characteristics of the beach....Fills containing fine material exposed to the swash zone are also likely to erode rapidly under wave action, causing a persistent adverse turbidity impact. Consequently, any benefit from restoration of beaches using this material will be temporary, and adverse impacts may include turbidity along the shore.

The Corps also examined the suitability of placing the fine sands in the nearshore zone, either in a berm or evenly across the seafloor offshore of Alamitos peninsula. Under both scenarios, the Corps concluded that placement of the dredged materials here would not nourish the beach or reduce wave erosion to any appreciable degree.

Commission staff met with Corps and Port staff and representatives of the Alamitos Bay Peninsula Beach Preservation Association to review the grain size data and the alternatives analysis in an effort to be certain that the proposed dredged materials could not be put to some beneficial use along the Alamitos peninsula shoreline, given the longstanding and ongoing beach erosion problems in this area (Exhibit 5). After a thorough review of the data, and after Commission staff meetings with local concerned citizens and Corps and Port staff over the past several months, the Commission agrees with the Corps that the proposed dredged material is not suitable for beach or nearshore placement, and that other disposal options must be considered.

The Corps next examined the potential for beneficial use of the dredged materials at approved landfill construction projects. The Port of Los Angeles informed the Corps that it could use the two million cubic yards of fine sands found at the top of dredging layer for use in its Pier 400 landfill project. There are no other landfills under construction or nearing a construction start that could accept additional dredged materials. Concerning placement of sediments at Pier 400, the Corps states that:

> The dredged material would be placed by hopper [dredge] into the approved channel area (North Channel) in the POLA just south of Pier 300, then transferred by an electric hydraulic pipeline dredge into the approved Pier 400 landfill. Placement activities would comply with the approved commitments developed in the Final Environmental Impact Statement/Report for Deep Draft Navigation Improvements, Los Angeles and Long Beach Harbors, San Pedro Bay, California.

Finally, and in order to avoid transporting the remaining dredged materials to the LA-2 offshore disposal site, the Corps examined the potential for using the materials for marine enhancement or restoration activities in the project vicinity. Given that the dredged materials were tested and found suitable for ocean disposal, the Corps identified several offshore pits which were created as a result of these pits being used for borrow material for nearby landfills. The Corps stated that:

> These pits are generally deep and wide areas that have a lower biological productivity than surrounding shallower areas due to lower dissolved oxygen and other problems such as trapping of contaminants. These ocean pits can also have adverse impacts on erosion based on trapping littoral material, or focusing wave energy to specific areas.

The Corps considered several borrow pits offshore of the City of Long Beach and ultimately determined that the pit southeast of Energy Island White was most feasible due to grain size compatibility, location, and available capacity. This pit ranges in depth from -30 feet to -60 feet MLLW, and would require approximately 1.6 million cubic yards of material to fill to the surrounding grade of -30 feet MLLW. The Corps also selected a deep water trench located in the Long Beach Main Channel for placement of 2.1 million c.y. of dredged material. This trench was created due to unpermitted overdredging during construction of the adjacent Pier J Landfill Expansion in the early 1990s. Elimination of this trench would return the Main Channel to its design depth, help maintain channel stability, and improve water circulation and biological productivity in adjacent waters.

Dredging and disposal affect water quality and marine habitat resources through turbidity, increases in suspended solids, and decreases in dissolved oxygen and light penetration. However, these impacts are usually temporary and are considered minor in nature. For the proposed project, the Corps expects that dredging impacts will be short-term in nature and not significant for plankton, benthic communities, and fish populations along and adjacent to the approach channel dredging area. Particular concern was noted for potential effects from dredging adjacent to the breakwater on the endangered California brown pelican and California least tern. The Corps determined that pelican roosting and foraging will be affected when dredging occurs at the breakwater, but that more than adequate replacement areas exist for these activities in the immediate vicinity, and that the project would not adversely affect the brown pelican. The California least tern is present in the Los Angeles/Long Beach harbor area from April through August. Turbidity from dredging at the breakwater could theoretically affect tern foraging; however, the water depth at this site makes it unlikely that dredging will have any adverse effect on tern foraging. The Commission therefore concludes that the proposed dredging will not adversely affect marine resources at or adjacent to the project site.

The Corps concludes that disposal operations will generate only minor and temporary effects on marine resources at the three proposed disposal sites. Placement of sediments at and adjacent to the Pier 400 landfill in the Port of Los Angeles will have negligible impacts due to ongoing construction activities at that site. However, mitigation measures currently in place for landfill construction will also apply to placement of the dredged materials from the Long Beach approach channel in order to ensure compliance with Pier 400 project environmental commitments.

Dredged material disposal in the Long Beach Main Channel will on balance generate net environmental benefits from the elimination of the deep water trench, and the expected improvements in water circulation and dissolved oxygen in the area. Disposal-related turbidity impacts will be minor and temporary in nature. Seabirds, particularly the California least tern, do not typically forage in this area due to water depths extending to -90 feet MLLW and frequent vessel traffic; therefore, no impacts on these marine resources are expected. Disposal in the energy island borrow pit will also generate temporary and minor effects on benthic communities, fish populations, and seabirds. The Corps expects that eliminating the borrow pit will lead to an improvement in marine habitat conditions by restoring the shallow seafloor at the borrow pit site, which would be more biologically productive than deeper habitats in this area. In addition, the National Marine Fisheries Service concluded that the proposed dredging and disposal project is environmentally sound.

The Commission therefore concludes, based on the above information and analysis of dredging and disposal options, that: (1) the proposed disposal of dredged material in the borrow pit southeast of Energy Island White is the least damaging feasible alternative, and is consistent with the alternatives test of Section 30233 of the Coastal Act, and (2) the disposal of dredged material at the two port locations (Pier 400 in Los Angeles and the Main Channel in Long Beach) minimizes adverse environmental impacts and is consistent with Sections 30706 and 30708 of the Coastal Act. In addition, the Commission concludes that the proposed dredged material disposal at Pier 400 in the Port of Los Angeles and in the Main Channel in the Port of Long Beach conforms with the disposal site designation policy of Section 30705(c) of the Coastal Act.

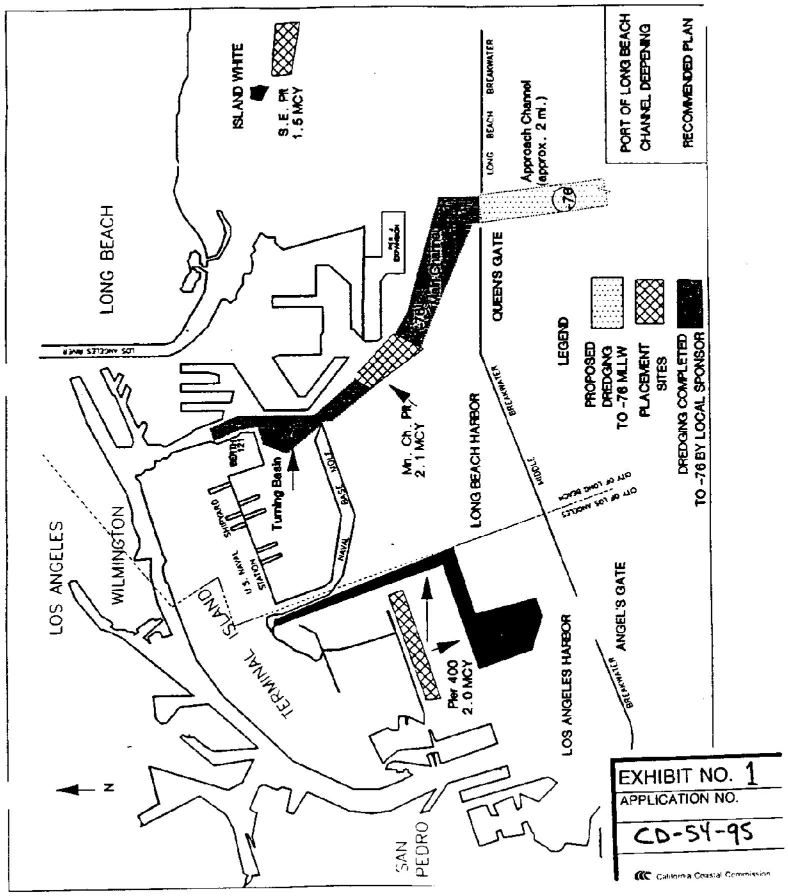
Finally, the Commission must evaluate any mitigation requirements generated by the project. The Corps of Engineers examined the potential effects on marine resources from dredging and disposal of 5.6 million cubic yards of clean dredged material and concluded that only minor and temporary impacts will occur. This project will result in minor, short-term impacts to existing benthic habitat, but the dredging and disposal areas will recolonize quickly over a two to three year period. Turbidity increases will be localized and short-lived, but as the Commission has found in analyzing comparable dredging projects, this type of impact is usually not significant. In conclusion, the proposed dredging and filling of coastal waters will not significantly affect the marine environment, is an allowable use, is the least damaging feasible alternative, and does not require additional mitigation beyond those measures incorporated into the proposed project by the Corps. Therefore, the Commission finds that the proposed project is consistent with the dredging, filling, and marine resource protection policies (Sections 30230, 30233, 30705, 30706, and 30708 of the Coastal Act) of the California Coastal Management Program.

B. Commercial and Recreational Fishing. The Coastal Act provides:

> 30224. Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.
>
> 30234. Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.
>
> 30234.5. The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

The Corps examined potential project-related impacts on commercial fishing activities in the project area and concluded that dredging and disposal operations will not adversely affect the live bait, commercial trap fishery, or recreational fishery in the project areas. Dredging in the approach channel may temporarily affect commercial and recreational fishing activity, but impacts should be minor due to existing vessel traffic in this corridor which currently limits safe fishing opportunities. There will be a temporary impact on fishing at and adjacent to the energy island borrow pit disposal site. However, filling this pit may increase the area available for California halibut spawning. There is no significant fishing activity occuring at the other two disposal sites due to construction activity at Pier 400 and vessel traffic in the Long Beach Main Channel. Therefore, the Commission concludes that the proposed project will not generate any significant impacts on commercial or recreational fishing, and is consistent with the commercial and recreational fishing policies (Sections 30224 and 30234 of the Coastal Act) of the California Coastal Management Program.

FIGURE 2. RECOMMENDED PLAN DREDGED MATERIAL PLACEMENT AREAS.



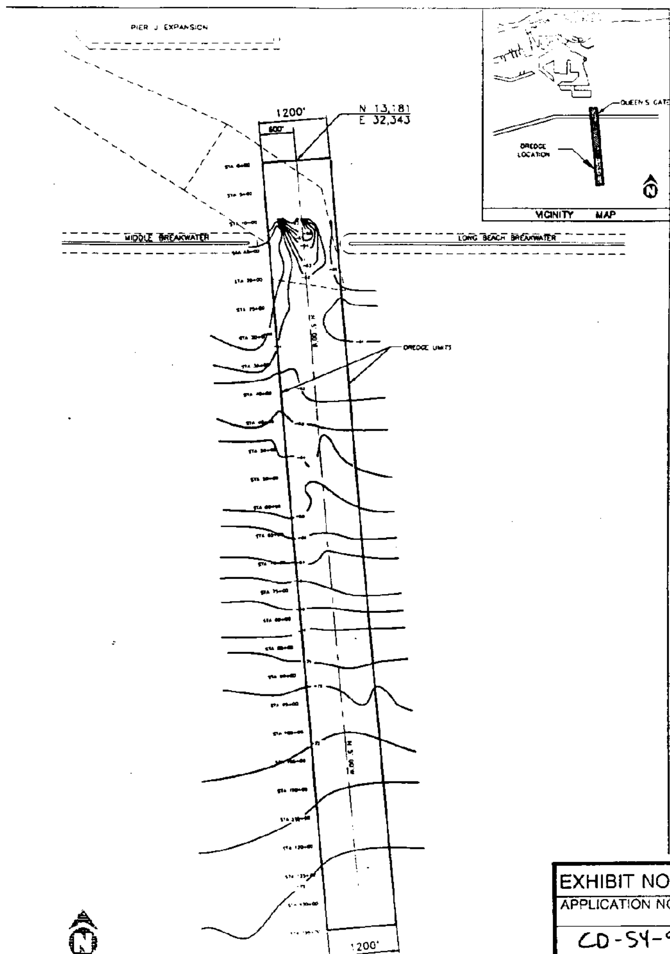


EXHIBIT NO. 2
APPLICATION NO.
CD-54-95

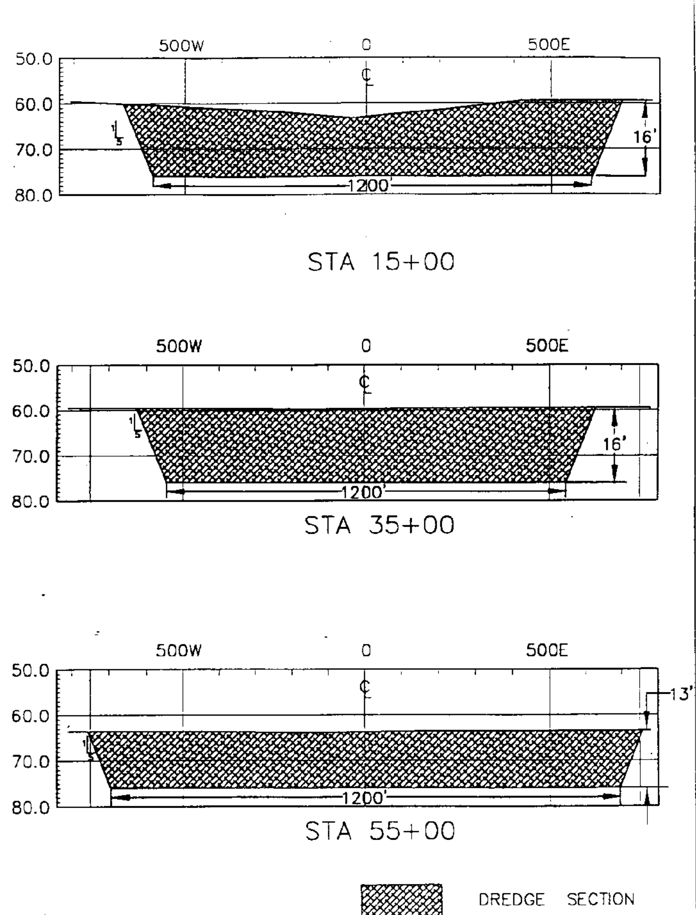
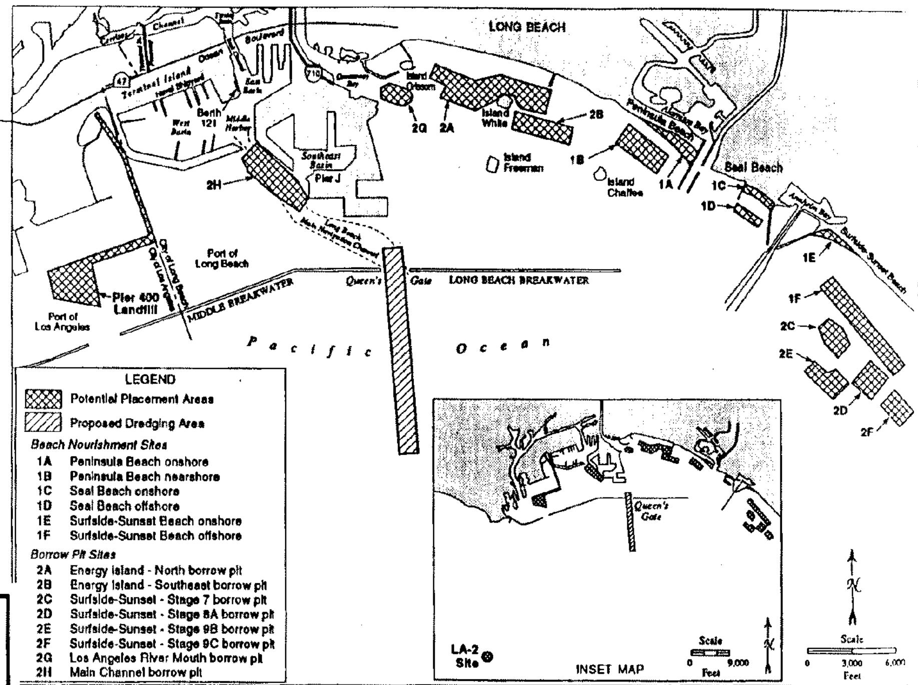


FIGURE 2

EXHIBIT NO. 3
APPLICATION NO.



"ure 3-1. Proposed Dredge Site and Sediment Placement Sites [illegible]tially Considered for Queen's Gate Deepening Project

3-4

EXHIBIT NO. 4
APPLICATION NO.
CD-54-95

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 EXECUTIVE SUMMARY

This chapter provides a summary of the proposed action, briefly describes the alternatives considered, summarizes the environmental impacts of the proposed action, outlines the commitments for a Mitigation Monitoring and Reporting Plan, identifies areas of concern, and presents the conclusions of the EIS/R.

1.1 SUMMARY OF PROPOSED ACTION

The proposed action is a modification of the existing federal navigation project at Long Beach Harbor to allow large crude petroleum tankers to more fully utilize their capacities, therby improving efficiency and reducing transportation costs. It involves deepening the approach channel outside the Queen's Gate entrance to the Port of Long Beach (POLB) from 60 feet below mean lower low water (MLLW) to 76 feet below MLLW to allow vessels to enter the harbor fully loaded. An area 1,200 feet wide by 14,000 feet long would be dredged. The total volume of dredged material is estimated to be 5.6 million cubic yards (mcy). While a number of potential placement options for the dredged material were initially considered (see section 1.2), the options that were carried forward into the co-equal environmental analysis include landfill at the Port of Los Angeles (POLA), three man-made borrow pits inside San Pedro Bay, as well as the EPA-designated deepwater ocean disposal site LA-2. The proposed dredge area and these placement sites are shown in Figure 1-1.

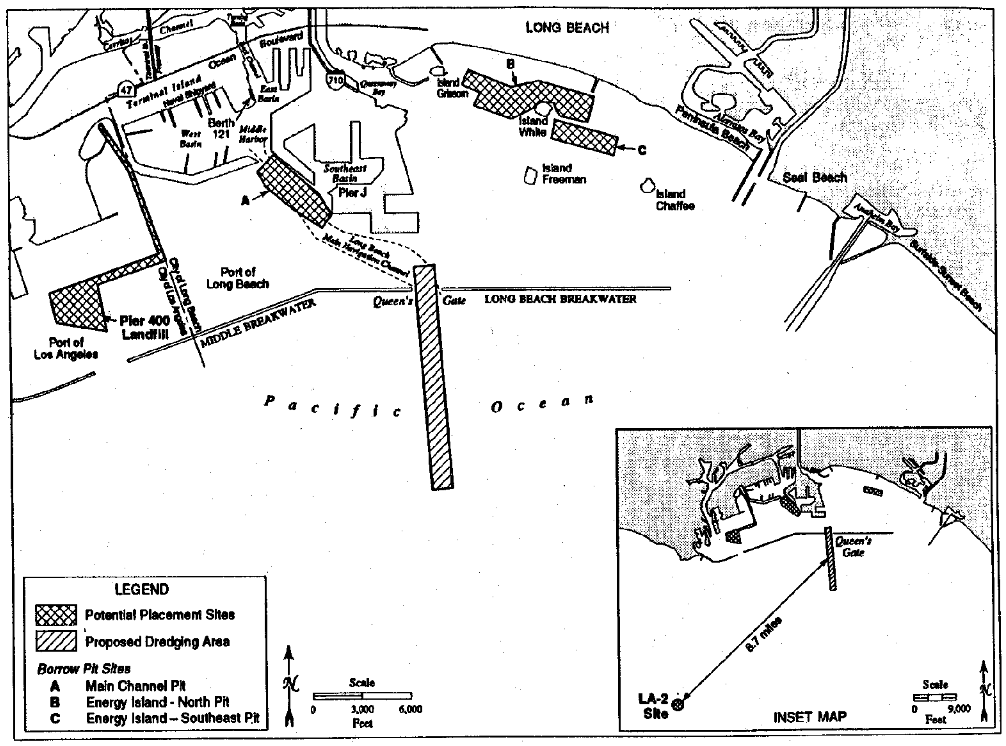
1.2 DESCRIPTION OF ALTERNATIVES CONSIDERED

A number of alternatives to the proposed action were initially considered; these are described in more detail in section 3.2. Alternatives to the proposed deepening included use of monobuoys or lightering to offload all or some of a tanker's petroleum cargo outside the breakwater, thereby reducing the tanker's draft to the point where it could transit to the terminal safely. The use of other ports and terminal modifications were also initially considered. For a number of reasons, these alternatives to the proposed deepening were not considered viable.

A number of alternative placement locations for the dredged material were also considered, including landfill in the POLA at Pier 400, borrow pits in the Long Beach Main Channel and near Island White, placement at the EPA-designated disposal area LA-2, onshore or nearshore placement for beach nourishment, and placement at an upland (inland) landfill. Through a site screening process (see section 3.2) that considered engineering feasibility, sediment suitability, environmental and cost considerations, all of these placement options were eliminated from further consideration except placement in a landfill at POLA, in borrow pits, or at the deep ocean site LA-2.

1.3 SUMMARY OF ENVIRONMENTAL IMPACTS

Environmental concerns identified during the scoping process are summarized in section 13.1. Environmental impacts were evaluated for the dredge site and the potential placement sites (see Chapter 4). For most of the resources, the impacts would be comparable regardless of the placement site selected. The only significant unavoidable impact would be a short-term impact on air quality during construction and would occur regardless of the placement option selected. All other resources addressed in this document would experience either adverse but insignificant impacts or no impact during construction. The project would result in several beneficial impacts (see below), and there would be no long-term unavoidable significant impacts.



"'igure 1-1. Proposed Dredge Site and Recommended Sediment P' ement Sites for Queen's Gate Deepening Project

The air quality impact is an exceedance of the significance thresholds for emissions of oxides of nitrogen (NO_x) and reactive organic compounds (ROC), established by the South Coast Air Quality Management District. These emissions would come from the dredge and associated support equipment during construction. Even with the proposed mitigation measures, these emissions would be above the designated significance thresholds. However, the temporary increase in emissions during construction would be offset by a long-term reduction in emissions from the larger tankers calling on the Port after the approach channel is deepened: fewer vessels more fully loaded would be necessary to transport the same amount of cargo. After the approach channel is deepened, long-term NO_x emissions from tankers would be reduced by 19.9 tons per year from existing (1994) levels and by 15.1 tons per year compared to the no-action alternative in the year 2010. Similarly, long-term ROC emissions from tankers would be reduced by 1.2 tons per year from existing (1994) levels and by 0.9 tons per year compared to the no-action alternative in the year 2010. Emissions of other pollutants, which would not exceed significance thresholds, would also be reduced over the long term.

A marine archaeological survey identified two submerged objects that could be associated with potential significant cultural resources, including a 19th century shipwreck. More detailed evaluation of the objects are required to determine their significance and extent of project impacts.

During construction, there would be either no impact or insignificant impacts on the following other resources addressed in this document: topography and geology, oceanography and water quality, marine resources, noise, land and water use, ground transportation, vessel transportation, and aesthetics.

The project would result in several beneficial impacts. Filling any of the borrow pits would have a beneficial effect on bottom topography. Filling the Energy Island pits could improve the local ecology because a shallower water habitat is generally more productive than deeper waters (see, for example, the U.S. Fish and Wildlife Service's Planning Aid Letter in Appendix E, as well as the Deep Draft Navigation Improvements [DDNI] EIS/R [COE and LAHD 1992]). It would also increase the amount of habitat suitable for California halibut spawning. The deeper channels would result in a long-term beneficial impact on vessel transportation by allowing the larger tankers to enter and exit the Port fully loaded, reducing delays due to tides and requiring fewer vessel calls to transport the same amount of cargo. This would also increase vessel safety. The project would provide jobs to approximately 20 people during the 16- to 22-month construction period; the available labor pool in the region could easily supply this workforce. Additional economic benefits would result from the purchase of construction materials and other related services. After the approach channel is deepened, the increased efficiency in the Port's handling of tanker vessel traffic and associated cargo could have a long-term beneficial effect on local port-related employment and revenues. After the channel is deepened, there would be a $29.5 million annual savings in transportation costs.

1.4 MITIGATION MONITORING AND REPORTING PLAN

The Mitigation Monitoring and Reporting Plan is shown in Table 1.4-1. The impacts addressed in this table are only those that are significant, as described for each resource in Chapter 4. Mitigation commitments associated with placement of material in a landfill at the POLA, outlined in the Deep Draft Navigation Improvements Final EIS (COE and LAHD 1992) would be the responsibility of the POLA.

If one or both of the submerged objects noted in section 1.3 as potentially significant cultural resources, are determined to be eligible for listing in the National Register of Historic Places and/or are significant under CEQA Appendix K criteria, a memorandum of agreement (MOA) will need to be executed. The

Table 1.4-1

MITIGATION MONITORING AND REPORTING PLAN

Resource	Significant Impact	Mitigation Measure	Monitoring Action	Responsible Party	Timing
POLA Pier 400, Main Channel Borrow Pit, Energy Island Borrow Pits, or LA-2					
Air Quality	Exceedance of AQMD NO_x emission thresholds due to dredging equipment and support launches.	Retard injection timing on all diesel powered equipment and vessels.	Certification of all equipment prior to dredging, then biannual spot monitoring.	Corps/ Contractor	By start of construction, then annual tune-up.
	Exceedance of AQMD ROC emission thresholds due to dredging equipment and support launches.	Implement reformulated fuel on all diesel powered equipment and vessels based on the following approximate specifications: (1) cetane number of 48.6, (2) sulfur content less than 0.05 percent by weight, (3) aromatics content less than 34.7 percent, (4) olefins content less than 2.1 percent, and (5) saturate content greater than 63.2 percent.	Identify reformulated fuel supply prior to construction, then maintain supply throughout construction. Spot monitoring for duration of construction.	Corps/ Contractor	During entire construction period.

MOA would stipulate the development and approval of a treatment plan that will guide the efforts to mitigate potentially adverse effects on the submerged objects. The Corps will be in compliance with Section 106 of the National Historic Preservation Act when the objects are determined to be not eligible for National Register listing, or when avoidance measures are developed and the MOA executed.

1.5 AREAS OF CONCERN

Areas of environmental concern with the proposed project are limited to the significant, unavoidable short-term air quality impacts during construction described in section 1.3. This concern, however, is offset by the fact that the project would result in a long-term air quality benefit. All other environmental impacts would be insignificant.

1.6 CONCLUSIONS

As noted in section 1.3, none of the placement alternatives would avoid significant impacts since construction air quality impacts could not be mitigated to insignificance regardless of the placement option selected. Of the five placement options, the POLA Pier 400 landfill and the three borrow pit sites would be preferred over LA-2, primarily because they are closer to the dredge site. Although the material is not compatible for local onshore beach nourishment purposes, disposal at any of the four sites in San Pedro Bay would not preclude retrieval of the material by interested parties for various other beneficial purposes (such as capping) in the future. Placement in the Pier 400 landfill would be a present beneficial use. Of these four sites in San Pedro Bay, the Pier 400 landfill would be preferred to the borrow pits. Among the three borrow pit sites, that in the Main Channel would be preferred to the two Energy Island pits. Of the two Energy Island pits, the southeast pit would be preferred to the north pit. The reasoning for this ranking of the placement sites is explained below.

Use of the POLA Pier 400 landfill has the advantage that it is already a permitted landfill. Also, since the dredged material would not impact a new area (it would be placed in the existing "footprint" established as part of the DDNI project), the only impacts attributable to the proposed project would be those due to transporting the material there. And, as noted above, selection of this site would allow a beneficial re-use of the material and would reduce the amount of "virgin" material the POLA must dredge to complete Pier 400.

Of the three borrow pit sites, the Main Channel borrow pit would be preferred. Filling this pit from its existing depth of 90 feet below MLLW to the surrounding depth of 76 feet below MLLW would increase circulation and dissolved oxygen in the area and could possibly increase bio-productivity. Filling this pit would return this portion of the channel to its optimum depth and would eliminate the potential for slumping of sediments in this area; this would increase the navigation channel's stability. This site is the closest to the dredge area; compared to the other sites, there would thus be less emissions from transporting the material there. Compared to the Energy Island borrow pits, this site is also far from more productive shallow water habitats, and thus less likely to cause turbidity impacts to foraging areas.

Of the two Energy Island borrow pits, the southeast pit would be preferred over the north pit. The southeast borrow pit is about 500 feet farther from a shallow water foraging area than the north borrow pit, so the potential for turbidity impacts on this foraging area would be slightly lower. Also, the EPA and other agencies have informally requested that the north pit be reserved for a possible future confined disposal site (i.e., a capping program).

LA-2's substantially further distance from the dredge site (it is over twice as far as the farthest site in San Pedro Bay) would result in higher emissions from transporting the material to this site. For example, if the LA-2 site were used instead of a combination of sites that included the POLA Pier 400, Main Channel borrow pit, and Energy Island southeast pit, there would be approximately 40 percent higher total NO_x emissions and 44 percent higher total ROC emissions. (While there would also be higher transportation costs for the LA-2 site, cost is not a factor in determining the environmentally preferred alternative; it is a factor in determining the National Economic Development plan discussed below.) Because of this site's depth, placing the material here would preclude any future beneficial re-use of the sediment.

Since only two of the five potential sites (Energy Island north pit and LA-2) could hold the total sediment volume (5.6 mcy), the other three sites (POLA Pier 400, Main Channel pit, and Energy Island southeast pit) would have to be used in some combination to accommodate all of the dredged material. Several alternatives are possible. Alternative placement scenarios were formulated by assigning the maximum sediment volume to the highest ranked site, then filling the next best site, and so on, until 5.6 mcy of capacity was used. Based on this strategy, the following three alternative placement scenarios were formulated, in addition to the no-action alternative.

The recommended (or preferred) plan (Alternative A) was formulated based on the most beneficial re-use of the material:

Alternative A:	POLA Pier 400	2.0 mcy
	Main Channel Pit	2.1 mcy
	Energy Island Southeast Pit	1.5 mcy
		5.6 mcy

The secondary plan (Alternative B) was formulated as an option in the event that placement in Pier 400 becomes infeasible in the future due to unforeseen technical or schedule problems:

Alternative B:	Main Channel Pit	2.1 mcy
	Energy Island Southeast Pit	1.5 mcy
	Energy Island North Pit	2.0 mcy
		5.6 mcy

The tertiary plan (Alternative C) was formulated as an option in the event that placement in the pits becomes infeasible in the future.

Alternative C:	LA-2	5.6 mcy

While the no-action alternative would have less impacts on most resources than any of the above alternatives, it would not achieve the project objective, nor would the substantial beneficial long-term impacts on air quality, reduced transportation costs, and improved vessel safety be realized.

The timing of dredging or the material placement location for the environmentally preferred alternative could be affected by the seasonal activity of certain sensitive biological resources, such as the California least tern and California brown pelican, that could be present near either the dredge site or borrow pit placement areas. It would be possible to avoid impacts on these species under Alternative A or B by considering these seasonal biological concerns in determining the order in which placement sites would be used (see section 6.1). Such concerns would not be an issue with Alternative C.

The National Economic Development (NED) Plan includes deepening the channel to 76 feet below MLLW, continued use of tides, and placement of the material at the same sites as the environmentally preferred plan, namely POLA Pier 400 landfill, the Main Channel borrow pit, and the Energy Island southeast borrow pit.

The recommended plan is the same as the NED Plan.

2.0 NEED FOR AND OBJECTIVES OF PROPOSED ACTION

2.1 DESCRIPTION OF PROPOSED ACTION

The U.S. Army Corps of Engineers, Los Angeles District (LAD) and the Port of Long Beach (POLB) propose to deepen and modify the main approach channel to the POLB from the Queen's Gate entrance out to approximately the 76-foot MLLW contour. The proposed project area is shown in Figure 1-1. Dredging operations would likely be conducted with the use of hopper dredges and other support vessels. Material placement options initially considered included offshore, nearshore, onshore, and inland alternatives; a site screening process (described in Chapter 3) subsequently eliminated the nearshore, onshore, and inland alternatives.

2.2 PURPOSE AND NEED

The navigation improvements at the POLB are needed to accommodate large, deep-draft vessels transporting crude oil to Berth T121 (see Figure 1-1), thereby improving cargo movement efficiencies and reducing transportation costs.

Existing Conditions

Over the past two decades, the use of larger and deeper draft ships has resulted in ever-increasing pressure to provide deeper draft channels and berths. In particular, crude oil tankers have increased dramatically in size to take advantage of economies of scale. At present, many of the larger tankers bringing crude oil to Berth T121 are forced to enter the POLB partially loaded (referred to as "light loaded") due to channel depth constraints at the POLB. The main navigation channel inside the breakwater has recently been deepened to a depth of 76 feet below MLLW, while the depth outside the breakwater is only 60 feet below MLLW.

Future Conditions

Future projections show the Nation's energy needs being met from foreign oil sources as a result of continued depletion of Alaskan reserves. Although there is a possibility that additional domestic sources will be developed, the size of those reserves is not expected to be sufficient to meet the Nation's long-term energy needs. Consequently, the longer haul distance from foreign sources will require deeper channels to accommodate the more efficient ultra-large crude carriers (300,000+ dead weight tonnage [DWT]).

There is the need and opportunity to increase the efficiency of existing operations by deepening the channel outside the breakwater to meet future demands by allowing larger crude carriers to call fully loaded.

2.3 PROJECT OBJECTIVE

The objective of this project is to increase the efficiency of crude throughput in a way that maximizes net benefits to the national economy, while having the least impact on the environment. Specific objectives used in plan formulation, and criteria for judging how well these objectives are met are provided in section 3.1.

2.4 STUDY AUTHORITY

Federal authorization and involvement in providing navigation features and improvements for Long Beach Harbor dates from 1856. Congress has authorized federal participation in the study of improvements in response to specific requests. The primary concern has been to ensure that harbor facilities are adequate to efficiently meet present and future cargo handling and distribution needs. The following is a summary of recent Congressional authorizations:

- The Water Resources Development Act of 1986 (P.L. 99-662, Title II, Harbor Development, Section 201(b) and Section 905);
- Water Resources Development Act of 1988 (P.L. 100-676, Section 4, Project Modifications); and
- Water Resources Development Act of 1990 (P.L. 101-640, Section 102, Project Modifications).

2.5 ENVIRONMENTAL PROCESS

The LAD and the POLB prepared this joint Environmental Impact Statement/Report (EIS/R) to address potential impacts associated with implementing their respective discretionary actions associated with the proposed project.

The LAD is the Lead Agency for the federal portion of this project, and has prepared this EIS in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321, as amended). The NEPA requires federal agencies to consider the environmental effects of their actions. When those actions potentially significantly affect the quality of the human environment, the agency must prepare environmental documentation that provides a full and fair discussion of significant impacts caused by the proposed project and alternatives.

The POLB is the Lead Agency for the local portion of this project, and has prepared this EIR in compliance with the California Environmental Quality Act (CEQA) of 1970 (Public Resources Code, Sections 21000-21177). The CEQA requires public agencies to fully disclose the environmental effects of proposed projects that require their discretionary approval. If a proposed project potentially has significant impacts on the environment, CEQA requires that an EIR be prepared.

The EIS/R process follows a series of prescribed steps. The first step, scoping, has been completed. The purpose of scoping was to solicit comments from agencies and the general public on the scope or extent of the issues to be addressed in the environmental document. The second step consisted of preparing this Draft EIS/R (DEIS/R) document. The third step consists of sending the DEIS/R out for a 45-day public review period, during which time both written and verbal comments are solicited on the adequacy of the document. The fourth step involves preparing a Final EIS/R (FEIS/R) that addresses comments received on the DEIS/R. The FEIS/R is furnished to all who commented on the DEIS/R, and is made available to anyone that requests a copy during the 30-day public comment period. The final step involves, for the federal EIS process, preparing a Record of Decision (ROD) and, for the state EIR process, certifying the EIR and adopting a Mitigation Monitoring and Reporting Plan. The ROD is a concise summary of the decisions made by the LAD and the POLB from among the alternatives presented in the FEIS/R. The ROD can be published immediately after the FEIS public comment period ends. A certified EIR indicates that the environmental document adequately assesses the environmental impacts of the proposed project.

3.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the considerations that determined the proposed action and alternatives, the preliminary alternatives that were initially considered, the alternatives that are analyzed in detail, and the proposed construction methods, timing considerations, and maintenance dredging requirements.

3.1 CONSIDERATIONS IN DETERMINING THE PROPOSED ACTION AND ALTERNATIVES

3.1.1 Planning Objectives

Based on the analysis of the identified problems, needs, and opportunities and the existing physical, human, and environmental conditions of the study area, the following planning objectives were identified to direct the formulation and evaluation of alternative plans:

1. Efficient Fleet. Optimize the efficiency of transporting existing and future waterborne commerce through the POLB by accommodating a more efficient crude oil tanker fleet.

2. Environmental. Preserve and improve environmental resources to the maximum extent practical.

Objective 1 is fundamental to improving the efficiencies of existing and future operations with respect to transportation costs, loading and unloading, and other costs associated with the movement of waterborne commerce. These objectives are consistent with federal planning guidelines and the primary goal of contributing to the Nation's economic development consistent with applicable environmental laws, regulations, and policy.

Objective 2 includes the specific objectives of alleviating existing and future air quality and traffic congestion impacts resulting from inefficient cargo handling operations. This objective is related to Federal, State, and local environmental statutes, regulations, and policies, and is characterized by the following four environmental goals: (1) avoid any unacceptable adverse impact on environmental resources, (2) where impacts are not avoidable, they should be minimized to the greatest possible extent, (3) any remaining unavoidable impacts must be mitigated to insignificance if possible, and (4) improve or restore environmental quality wherever possible without adding undue cost or compromising the primary objectives.

3.1.2 Federal Considerations

The criteria set forth below represent how different plans are evaluated under federal guidelines. They also provide the guidelines for screening the potential alternatives to determine a recommended plan. The four main evaluation criteria used in LAD plan formulation are effectiveness, efficiency, completeness, and public acceptability.

1. Effectiveness - the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.

2. Efficiency - the extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.

3. Completeness - the extent to which an alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects.

4. Acceptability - the workability and viability of the alternative plans with respect to acceptance by state and local entities and the public, and compatibility with existing laws, regulations, and public policies.

3.1.3 Port of Long Beach Considerations

The planning considerations set forth below were used to evaluate the proposed project in accordance with local guidelines:

1. Tenant Efficiency. Allow POLB tenants to utilize more efficient, deeper draft tankers. Use of these cost-effective, deeper draft vessels would result in POLB tenants being more competitive.

2. Tenant Safety. Improve safety when bringing ships into the POLB by reducing the number of tanker trips as well as improving the entrance channel clearances, thereby reducing the likelihood of collisions and spills.

3. Environmental. Preserve and improve environmental resources within San Pedro Bay to the maximum extent possible with the reduction of air pollutants by reducing emissions per ton of cargo.

3.2 PRELIMINARY ALTERNATIVES

The following three preliminary alternatives were considered: use of monobuoys, lightering, and/or port modifications (i.e., deepening navigation channels and using tides). The viability of each of these alternatives in meeting the project objective is discussed below. The no-action alternative is described in section 3.3.2 and its impacts are analyzed in Chapter 5 of this report.

3.2.1 Monobuoys

Monobuoys located offshore of the POLB is an alternative to landside cargo transfers which could be used to handle crude petroleum shipments. A monobuoy is an open-water moorage where ships are tied to a specially designed floating buoy anchored to the sea floor. The moored ship is free to pivot around the buoy in a weather-vane fashion in response to wind, wave, and tidal conditions. This type of moorage is suitable *only* for loading and unloading of liquid-bulk cargoes such as crude oil, petroleum products, and minerals or other bulk commodities that can be handled in slurry form. Cargo is transferred through floating hoses from the ship to the monobuoy and through a submarine pipeline from the monobuoy to the landside terminal. Substantial areas of water deep enough to accommodate the swing radius of moored ships are required for the monobuoy alternative, and substantial amounts of submerged pipeline are also required. Monobuoy moorages were dismissed because there are no suitable sites within pumping range for tankers, and because of substantial environmental risks, as discussed below.

- Monobuoys would need to be located outside the existing navigational precautionary areas linking ocean shipping lanes to harbor entrances. This exclusion would place the monobuoys about 9 miles from an onshore tank-farm location; such a distance is beyond the maximum tanker-pumping range of 5 to 6 miles. Placing the monobuoys north or south of the precautionary area would locate the pipelines and/or terminal areas in heavily developed residential areas or areas such as the Palos Verdes shoreline and undeveloped Orange County coastline, rather than in the industrialized POLB area.

- There would be potential catastrophic environmental impacts if an accidental oil spill occurred in open water. To contain and control cargo spills, it would be preferable to locate the moorages in sheltered waters, such as inside the breakwater. Substantial dredging for navigation channels and turning basins would be needed for all moorages inside the harbor. The area needed for these activities could occupy a large portion of the harbor.

- Adverse weather conditions would reduce the amount of time the monobuoy could be used.

3.2.2 Lightering

Lightering involves offloading a portion of a fully loaded vessel's cargo onto another, smaller vessel somewhere outside the terminal until the incoming vessel's draft has been reduced to the point where it can safely transit to the terminal. Since the only area available for lightering that has adequate depth for the larger vessels to come in fully loaded is outside the breakwater in open ocean conditions, the potential for spills during transfer operations is relatively high. In addition, the extra cost of lightering, including use of smaller vessels and delay costs for the large vessels, would be considerable. For these reasons, lightering was eliminated from further consideration.

3.2.3 Deepening the Port of Long Beach Queen's Gate Main Navigation Channel

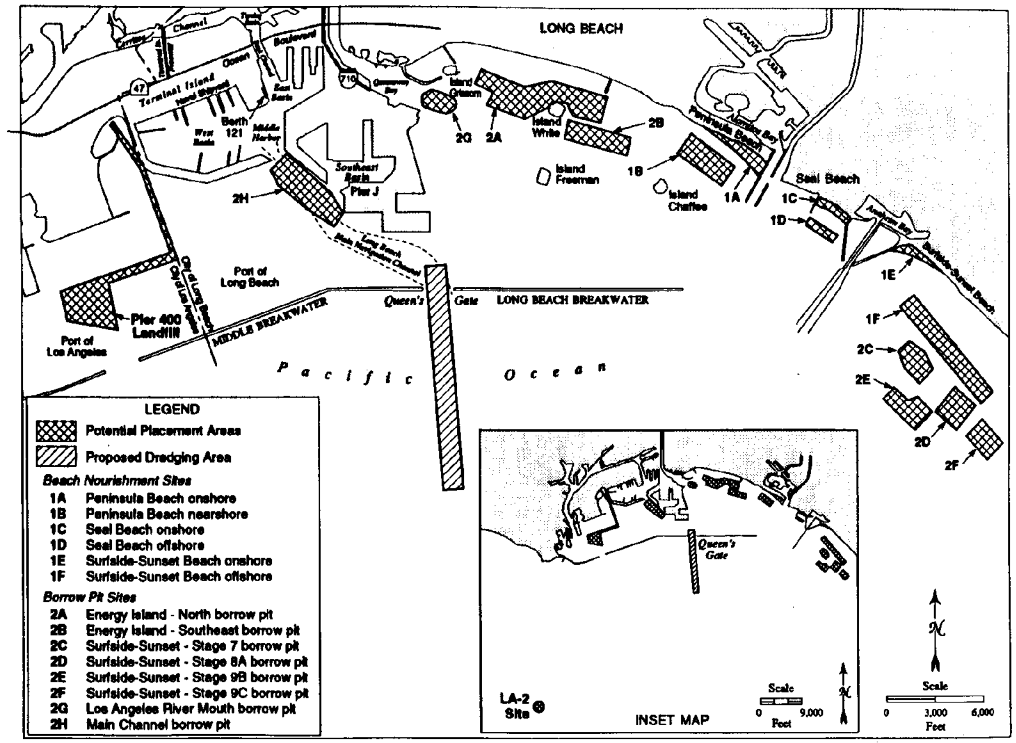
Deepening the Queen's Gate main channel would involve dredging the approach channel to the POLB and placing the dredged material at one or more of the placement sites described below. The dredge area and all potential placement sites are shown in Figure 3-1.

3.2.3.1 Depth Configurations

Various depths between -63 and -78 feet MLLW were analyzed to determine the most feasible depths for allowing vessel traffic to enter the channel fully loaded. It was determined that a channel depth of -76 feet with the use of up to 3 feet of tide would best meet project needs. At this depth, approximately 5.6 million cubic yards of material would be removed.

3.2.3.2 Criteria for Selecting Material Placement Sites

Criteria for selecting suitable sites for dredged material placement include engineering feasibility and economic considerations; federal and local support and acceptability; sediment suitability (including grain size and chemistry compatibility) for a given site; and environmental considerations. The results of a geotechnical and chemical evaluation of sediment from the dredge site and several potential placement sites, together with other environmental and cost factors, were used to identify suitable sites.



"'ure 3-1. Proposed Dredge Site and Sediment Placement Site' 'ially Considered for Queen's Gate Deepening Project

Sediment Suitability Criteria

Grain Size Compatibility

The LAD's guidelines for sediment suitability for beach nourishment state that the percent of "fines" in a composite sediment sample from the dredge site must be within 10 percent of the percent of fines at the receiving beach to be suitable for beach nourishment. ("Fines" are the finer-grained sediments commonly referred to as silts or clays.) Sediments would be considered suitable for placement in a borrow pit if the proposed dredge sediments are, on average, as coarse or coarser than existing pit sediments.

Sediment Chemistry Compatibility

To determine chemistry compatibility, sediment quality was assessed (Sea Surveyor, Inc. 1994) for the proposed dredge area and the potential receiver sites with respect to reference sites and California Clean Coast data compiled by the Southern California Coastal Water Research Project (SCCWRP). In addition, site-specific comparisons of organic contaminants and metals were made between sediments at the dredge area and potential receiver sites. If the material is found to be relatively free of contaminants as compared to the reference sites and the dredge area sediments are cleaner than placement site sediments, then dredge material can be placed in the receiver sites.

3.2.3.3 Material Placement Options

The material placement options for the dredged sediment include:

1. Landfill in the Port of Los Angeles (POLA) at Pier 400;
2. Placement in borrow pits, including Main Channel, Energy Island North and Southeast, and Los Angeles River Mouth;
3. Offshore placement at LA-2;
4. Nearshore placement, including Peninsula Beach, Seal Beach, and Surfside-Sunset beaches;
5. Onshore placement, including Peninsula Beach, Seal Beach, and Surfside-Sunset beaches; and
6. Landfill at upland sites.

Pertinent characteristics of each of the potential placement sites, including capacities, are identified in Table 3-1. Figure 3-1 shows all potential placement options except upland landfill sites.

Inland Material Placement at the Port of Los Angeles

Placement of the dredged sediment in a permitted landfill in the POLA was considered for the Pier 400 project. The POLA has reviewed the geotechnical and chemical characteristics of the dredge material and is interested in obtaining the material classified as silty-sand, approximately 2.0 mcy of material. The dredged material would be placed by hopper into the approved channel area (North Channel) in the POLA just south of Pier 300, then transferred by an electric hydraulic pipeline dredge into the approved Pier 400 landfill (see Figure 3-2). Placement activities would comply with the approved commitments developed in the Final Environmental Impact Statement/Report for Deep Draft Navigation Improvements,

Table 3-1

SUMMARY CHARACTERISTICS OF POTENTIAL PLACEMENT SITES

Placement Site	Distance from Dredge Site (mi.)	Capacity (mcy)	Placement Depth (ft., MLLW)	Approximate Existing Depth (ft., MLLW)	Approximate Depth After Placement (ft., MLLW)	Acres Affected
POLA Pier 400 Landfill	4.2	2.0	Variable	Variable	Variable	NA*
Borrow Pits						
• Main Channel Pit	2.5	2.1	-90	-90	-80	130
• Energy Island						
- North Pit	3.4	7.2	-60	-60	-30	250
- Southeast Pit	3.7	1.5	-60	-60	-30	92
• LA River Mouth Pit	3.3	1.0	-50	-50	-30	35
SUBTOTAL BORROW PITS		11.8				
LA-2	8.7	5.6	-387 to -1,050	-387 to -1,050	Variable	NA*
Peninsula Beach	3.4					
• Onshore		1.4	-12 to +12			64
• Nearshore Mound		1.0	-15 to -22	-35	-10	118
Seal Beach	4.5					
• Onshore		0.5	-12 to +12			28
• Nearshore Mound		0.4	-16 to -20	-20	-10	55
Surfside-Sunset beaches	5.3					
• Onshore		1.7	-12 to +12			93
• Nearshore Mound		5.0	-25 to +10	-25	-10	172
• Borrow Pits						
- Stage 7 Pit	5.1	0.8	-36 to -32	-36	-32	24
- Stage 8A Pit	5.7	1.1	-47 to -35	-47	-35	19
- Stage 9B Pit	5.1	1.1	-51 to -40	-51	-40	20
- Stage 9C Pit	6.1	0.8	-45 to -35	-45	-35	15
SUBTOTAL ONSHORE/NEARSHORE		13.8				
TOTAL CAPACITY		33.2				

*NA = New area would not be affected by the proposed project.

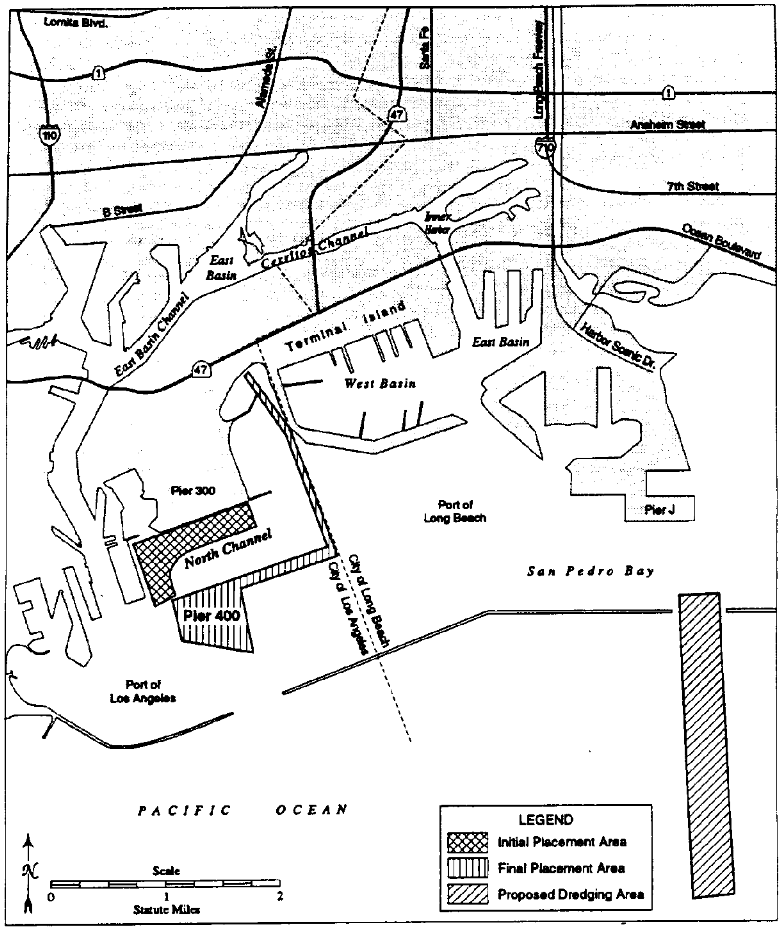


Figure 3-2. Proposed Placement at POLA Pier 400 Landfill

Los Angeles and Long Beach Harbors, San Pedro Bay, California (COE and LAHD 1992). Both the environmental review and permitting processes of the Pier 400 landfill activities have been completed and approved. That previous environmental review considered the impacts of dredging in the POLA and placement of material in the Pier 400 landfill. Since environmental conditions have not changed significantly since that time, only the impacts of ***transporting*** the sediment to this site are analyzed for the proposed project.

Placement in Borrow Pits

Figure 3-1 also identifies the original array of borrow sites considered for placement of the dredged material. These pits include: the Main Channel pit, two Energy Island borrow pits, and a borrow pit at the mouth of the Los Angeles River. Material to be placed in these pits would be that material determined unsuitable for the POLA Pier 400 project; these sediments consist of predominately silt (2.1 mcy) and, secondarily, clay (0.6 mcy).

Main Channel Borrow Pit

The Main Channel borrow pit is approximately 130 acres and could accommodate approximately 2.1 mcy. Placement in this pit would raise the existing bottom of the pit from -90 feet to -80 feet MLLW, which is approximately the depth of the main navigation channel in the POLB. This channel is at its optimum depth for future transportation needs; therefore, future dredging events in this channel are not expected. Dredge materials were determined to be suitable for placement in this pit based on physical and chemical characteristics. In addition, the cost would be relatively low in comparison to the other alternatives, and there is little potential for adverse environmental effects. Therefore, this site was carried forward into the detailed impact analysis.

Energy Island Borrow Pits

The Energy Island borrow pits near Island White were used as a source of material when the four Energy Islands were built in the 1960s. The two pits identified for potential use with this project have a combined area of 340 acres and could contain 8.4 mcy. The North Pit (located just north of Island White) has an area of approximately 250 acres, and could hold an estimated 7.2 mcy. The Southeast Pit (located southeast of Island White) is approximately 1,000 feet wide and 4,000 feet long, or approximately 92 acres, and could hold about 1.5 mcy. The dredge sediment was deemed suitable for placement in these pits for the same reasons noted above for the Main Channel pit. Therefore, these two sites were carried forward into the detailed impact analysis.

Los Angeles River Mouth Borrow Pit

This pit, as it name indicates, is located at the mouth of the Los Angeles River, approximately 1.7 miles from the dredge site and about 1,600 feet offshore. It has a capacity of 1.0 mcy. This pit has been historically used for emergency dredge activities from Golden Shores landing entrance near the mouth of the Los Angeles River. In fact, in March 1995, approximately 600,000 cy of material were placed in this pit as part of an emergency dredging action. Because of the likely need for this pit for emergency dredging actions in the future, this site will not be used for the proposed project, but will be saved for future emergency actions associated with the Golden Shores Landing Entrance near the Los Angeles River mouth.

Offshore Placement at LA-2

LA-2 is an EPA-designated ocean disposal site for dredged material from the POLB and POLA; this site was officially designated for dredged material in 1991. LA-2 is located near the edge of the continental shelf, 8.7 miles from the center of the dredge area. The area of the site is approximately 2.38 square miles, and the water depth varies from 387 to 1,050 feet. The site is in the process of being recertified by the EPA (personal communication, A. Ota 1994). Because the dredge materials are suitable, both physically and chemically, for placement at this site, it is assumed that all of the dredged material could be placed at this site. This site was carried forward into the detailed impact analysis because it is a designated disposal site for dredged material.

On/Nearshore Placement

Potential on/nearshore placement sites include: Peninsula Beach, Seal and Surfside-Sunset Beaches. Thus, careful consideration was given to the suitability of the material for beach nourishment purposes, which is a beneficial use highly desired by local Cities and other interests. However, based on the material testing program results and design criteria used for the material suitability for beach nourishment, it was concluded that little, if any, benefit can be expected in using the material for beach nourishment either by on nearhore placement. The reasons for this conclusion are as follows:

Onshore Placement

The results of the material testing indicate that about 1.8 to 2.1 million cubic yards of the material to be dredged consists of fine grained sand (0.1 mm) with significant proportions of silts and clays. The criteria developed jointly by the EPA and the Los Angeles District Corps of Engineers for beach compatibility of dredge material is that the material be clean and grain size compatible, i.e. the grain size distribution fall within the envelope of grain sizes of the beach and the percent of silts and clays not exceed that of the receiving beach by more than 10 percent. For the material to be compatible with the beaches along Alamitos Bay peninsula, the diameters should be between 0.15 and 2.0 mm or somewhat coarser. A preliminary estimate of the additional cost for placing the material on the beach is about $1 to $1.5 million. If the material was placed on the beach, it can be expected that 25 to 50 percent of the material could be lost during dredging and placement operations, resulting in about 2 to 3 million cubic yards to be actually placed for beach restoration. The placement of the finer material to restore beaches will change the characteristics of the beach and be aesthetically unacceptable as the silt and clay fractions typically settle on the surface of hydraulically placed fill. Fills containing fines exposed to the swash zone is also likely to erode rapidly under wave action, causing a persistent adverse turbidity impact. Consequently, any benefit from restoration of beaches using this material will be temporary and adverse impacts will be caused to beach characteristics and turbidity along the shore.

Nearshore Placement

Test results show the fine sand to be dredged from the channel deepening plan is compatible with nearshore bottom material seaward of the Alamitos Bay ocean beaches. This option involves the spreading of dredged material in the nearshore to raise bottom elevations two to four feet depending on the length and width of the placement area. A preliminary estimate of the additional costs for this type of placement would be between $500,000 and $1 million. The change in offshore bathymetry and nearshore profiles caused by raising the nearshore bathymetry two to four feet in depths of -30 to -15 feet, MLLW would not cause any significant change in the wave climate in the surf zone area where most erosion and storm damage potential occurs. Consequently, this option is not expected to have any significant benefits to reducing erosion or restoring protective beaches, while it would add considerable cost and adverse impacts to a wide spread area of the shallow water benthic environment.

POLB Nearshore Berm

The construction of a nearshore berm is another technique that may have some merits in providing shore protection and beach nourishment to coastal areas. This concept involves placing material in the nearshore area as shallow and close to the shore as equipment allows (generally between -30 feet and -10 feet, MLLW) to build a wide mound to elevations of -10 to -15 feet, MLLW. Under gentle swell condition, sand from the mound is expected to migrate shoreward providing nourishment and restoring adjacent beaches. The mound is also expected to cause large storm waves to break further offshore which provides for greater dissipation of wave energy and should reduce erosion and storm damage potential. At this time, the Corps has not utilized this technique for shore protection, however, several demonstration projects have been performed using dredged material from navigation and other channel dredging projects that qualitatively suggest some beach nourishment benefits. For this technique, it is desirable for the site to be exposed to ocean swell and that the placed materials contain a high proportion of beach compatible grain sizes. The placement of fine sand such as the material from the Port of Long Beach channel deepening to build the mound is expected to realize similar losses as beach placement with respect to actual volumes placed to create the mound and could cost an additional $500,000 to $1 million. The construction of a mound with the Port of Long Beach channel deepening material within the sheltered waves of San Pedro Bay would likely create a relatively stable feature which would have minimum or no beach nourishment or wave energy dissipation benefit, since it would be rare for wave conditions to be extreme enough for the mound to effect wave breaking. On such high wave occasions, the mound would likely experience significant erosion. Similar to the beach placement option, there will be turbidity impacts, but it is expected that these would be less persistent and after initial placement only occur when higher than normal wave conditions. A large area of shallow water, benthic habitat would be covered causing temporary adverse biological impacts. Consequently, any benefit from placement of the material to construct a nearshore berm is likely to be minor and infrequent.

Upland Material Placement

The possibility of placing material at upland landfill sites was considered, but this option was eliminated from further study early in the site screening process because of cost considerations, capacity limitations, and regulatory policy (the Regional Water Quality Control Board would consider the dredge sediment unsuitable for upland sites because of its high salinity).

3.2.4 Use of Other Ports and/or Terminal Modifications

3.2.4.1 Use of Other Ports

There are no other ports on the West Coast with available depths and terminal capacities to allow for more efficient movement of the volume of crude projected to come through the POLB. The only other port near the proposed refinery for this crude that could possibly be used is the POLA. A recent federal project approved at the POLA includes channel deepening and landfill creation at Pier 400 with development of petroleum terminals. The channel depth authorized for that project is 81 feet. Although this depth would accommodate the larger vessels expected at the POLB, the cost of building additional landside terminal facilities at POLA (including new landfill area, storage tanks, and associated pumping and piping facilities) would be prohibitive.

3.2.4.2 Use of Other Terminals in San Pedro Ports

All terminals in the POLA and POLB will be operating at or near capacity in the future. In addition, the movement of tanks, pipelines, and other facilities can be extremely costly. Based on discussions with several terminal operators, it is estimated to cost over $50 million to move one facility. Accordingly, use of other terminals in San Pedro Harbor is not considered a viable measure.

3.2.5 Other Potential Uses

Potential end uses for dredged material from this project also include allowing other entities to use some or all of the material for beneficial purposes. Such projects would require separate permitting and environmental review. Beyond those discussed in this EIS/R, there are currently no such proposals for beneficial use projects. If additional proposals for beneficial use projects for this dredged material are made during the environmental review process, they will be disclosed to the public and discussed in the record. However, analysis of the environmental impacts of other beneficial use projects that do not require action by the LAD would be beyond the scope of the proposed action. The analysis of the environmental impacts of such an action would be the responsibility of the federal, state, or local agency proposing the action.

3.3 SUMMARY OF ALTERNATIVES CONSIDERED FOR FURTHER STUDY

Table 3-2 provides a preliminary comparison of the potential placement options and the no-action alternative. This table compares each placement option's capacity, its relative economic ranking, various environmental considerations, general support among the public and resource agencies and, finally, whether the placement option is one of the "final" alternatives considered for detailed study in this EIS/R.

3.3.1 Deepening Queen's Gate Channel

Deepening the Queen's Gate main entrance channel is the alternative that would meet the objective of the project -- to allow large crude-oil tankers to offload safely and efficiently -- in the least environmentally damaging manner at the least cost. The receiver sites for placement of dredged material that met the criteria described above (section 3.2.3.2) include the POLA Pier 400 landfill site, the Main Channel and Energy Island borrow pits, and LA-2 (see Figure 1-1). Details related to the placement scenario for each site are summarized in Table 3-3.

<u>Ancillary Facilities</u>

Crude Oil Storage Tanks

The proposed project would require some landside development. Under project conditions (i.e., after the proposed deepening), larger vessels would bring in larger quantities of crude that will require an additional storage capacity of approximately 1.05 million barrels. Additional facilities (two to three tanks and the associated piping) would be installed and connected to existing ARCO storage facilities. Construction of the storage tanks would occur in a previously disturbed area (an existing parking lot) located in the City of Carson and adjacent to the City of Los Angeles (Figure 3-3). Site development would include the use of about 8.5 acres of land. These storage facilities would be made available to users of Berth T121 for offloading the larger vessels. An existing crude oil pipeline would be used to transport the oil from Berth T121 to the tanks. Although it would take longer to offload each ship, the additional facilities are not expected to change current offloading procedures. The oil stored in the new tanks would be processed at the adjacent ARCO Watson Refinery. The additional storage capacity would not change the processing throughput at this refinery. The refinery is already operating at its maximum allowed capacity, and this capacity cannot increase because of air quality constraints. Although the proposed project requires the additional storage capacity of these crude oil tanks, these tanks are not part of the federal project. Impacts associated with these tanks are briefly discussed in this EIS/R; a detailed impact analysis will be provided in a separate environmental document by the applicant (ARCO) prior to construction of the tanks.

Following construction, operational emissions per ton of cargo offloaded at Berth T121 would be lower compared to current levels.

Staging Area

The project would also require the use of a 2-acre temporary staging and storage site to support the dredging activity. The proposed location of this staging/storage area would be the eastern end of the Naval Base Mole (Figure 3-3), a site which is currently vacant and paved. This is federally owned land under the control of the U.S. Navy. Many facilities on the mole are now vacant, but were previously occupied by the U.S. Naval Station Long Beach which is now closed. The Naval Mole area has been used in the past for fuel storage, an intermediate maintenance area, a ship supplies facility, a communications center, and a recreation area. The Navy plans to lease the staging area site to the POLB.

Table 3-2

PRELIMINARY COMPARISON OF POTENTIAL PLACEMENT OPTIONS AND THE NO-ACTION ALTERNATIVE

Site	Sufficient Capacity	Economic Ranking[1]	Environmental Considerations: Geo	Chem	Bio	Air Quality	Beneficial Use	Support Level[2]	Final Alternatives
POLA Pier 400	No	1	0/+	0	0	-S	Yes	High	Yes
Pits	Yes	1	0/+	+	+	-S	Yes	High	Yes
LA-2	NK	4	0	0	0	-S	No	Medium	Maybe
Onshore	Yes	3	-S	0	-S	-S	NA	None	No
Nearshore	Yes	2	-S	-S	-S	-S	NA	Medium	No
Upland	No	5	NE	NE	NE	-S	NO	None	No
No-Action	NA	6[3]	0	0	0	-L	NA	None	Yes[c]

Abbreviations:
+ = Positive Impact
- = Negative Impact
0 = Neutral/Questionable Impact
S = Short-term Impact
L = Long-term Impact
NE = Not Evaluated
NA = Not Applicable
NK = Not Known at this time

[1] "Economic Ranking" is the relative cost associated with each potential placement site. POLA Pier 400 and the borrow pits would have the lowest and very comparable costs, so both options are assigned a "1" for economic ranking.
[2] "Support Level" is the level of support or interest in the placement option by affected agencies.
[3] The costs associated with the no-action alternative are long-term transportation costs.

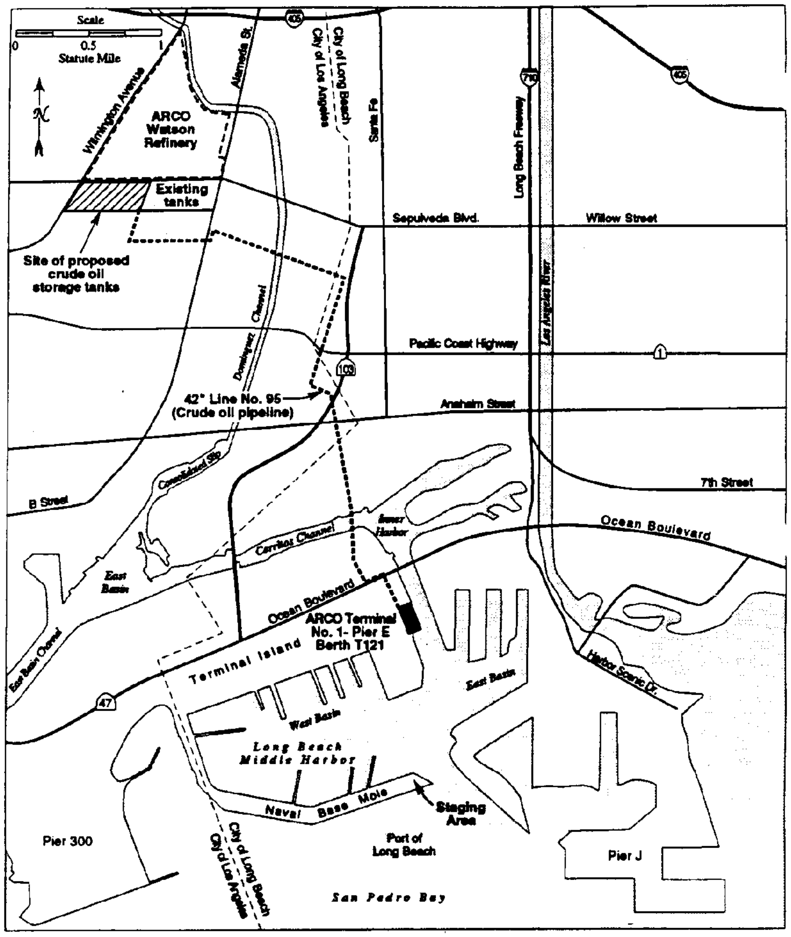


Figure 3-3. Location of Proposed Crude Oil Storage Tanks and Staging Area

Table 3-3
Estimated Placement Scenario Details for the Potential Placement Sites

Placement Site	*Trips/Day*	*Total Days*	*Total Trips*	*Total Months*
POLA Pier 400 (2.0 mcy)	6.9	178	1,235	5.9
Main Channel Pit (2.1 mcy)	8.8	147	1,296	4.9
Energy Island - North Pit (5.6 mcy)	7.4	474	3,457	15.6
Energy Island - Southeast Pit (1.5 mcy)	7.4	126	926	4.2
LA-2 (5.6 mcy)	5.4	639	3,457	21.3

3.3.2 No-Action Alternative

For comparison purposes, and consistent with NEPA and CEQA, the no-action alternative is also considered for further study. Under the no-action alternative, large, deep draft tankers would continue to use tides between 2 and 3 feet for port entry. The proposed deepening of the approach channel would not occur, and the controlling depth would remain at 60 feet below MLLW. This would require that tankers approximately 200,000 DWT and above would have to enter the port light-loaded on tides, which would be an inefficient and costly operation. The largest vessel currently calling on Berth T121 is 265,000 DWT and, because of existing depth restrictions, must be very light-loaded.

Table 3-4 summarizes the annual number of ship visits by ship size to Berth T121 under both the no-action alternative and the with-project condition (i.e., after the deepening). The fleet will trend toward deeper draft vessels in the future due to a projected shift of trade routes to the Far East and Persian Gulf, and also due to economies of scale. Under the no-action alternative, this will result in nearly all crude tankers having to light load in the future to enter the POLB.

Table 3-4 shows that for every projected future year (2000 to 2040), the total annual number of vessel trips to Berth T121 would be higher under the no-action alternative than for the with-project condition. For example, in the year 2000, there would be 79 trips under the no-action alternative compared to 59 trips with the project; in the year 2010, 74 trips compared to 52 trips; and, in the year 2040, 63 trips compared to 45 trips. Over the 40-year projection period, total annual vessel trips to Berth T121 are projected to decline 21 percent under the no-action alternative and 44 percent under the with-project condition.

Table 3-4

EXISTING AND PROJECTED VESSEL TRIPS TO BERTH T121 (1994-2040)

Ship Size (1000 DWT)	Existing (1994)	2000	2005	2010	2015	2020	2025	2030	2035	2040
No-Action Alternative										
200	50	50	48	45	45	38	35	30	30	28
265	30	29	29	29	29	34	34	35	35	35
SUBTOTAL NO-ACTION	80	79	77	74	74	72	69	65	65	63
With the Project										
200	50	10	10	10	12	13	13	13	12	12
265	30	37	30	22	18	14	11	8	7	6
300	0	5	7	9	10	11	11	11	11	12
325	0	2	2	2	2	3	3	3	2	2
365	0	5	7	9	10	12	12	12	12	13
SUBTOTAL WITH-PROJECT	80	59	56	52	52	53	50	47	44	45

Source: *Long Beach Main Channel Economic Analysis* (COE 1995). Trips for future years have been rounded to the nearest whole number.

3.4 PROPOSED CONSTRUCTION AND TIMING

3.4.1 Construction Methods

One 3,600-cy capacity hopper dredge would most likely be used for dredging and placement of the estimated 5.6 mcy of material. Cutter-suction pipeline dredges were also considered but rejected for several reasons. First, they are not very suitable for open ocean operations outside the breakwater due to the nature of the cutter arm, pipeline, and pumpout pipeline connections. Second, they are not easily moved, and would thus have a greater impact on vessel traffic during operations, and third, the pumping distance to the proposed placement sites would make the cost of this option prohibitive.

A hopper dredge picks up material by pulling a suction drag head along the bottom. The excavated material is stored on-board in a compartment called the vessel hopper. When full, it travels and discharges its load at the placement site, either by bottom dumping or pumping out the material. It is assumed that, for this operation, the hopper would be able to weir off (i.e., drain off) excess water at the dredge site to consolidate the load. This dredge is considered "ocean-going" and can operate in exposed wave conditions on the order of 4 to 5 feet. It can excavate to 80 feet in depth. The dredge would operate in existing waterways with minimum disturbances to passing ships. The hopper dredge is assumed to use bottom dumping for placement of material into the North Channel area at the POLA, into the borrow pits, or at the LA-2 site. (For the POLA option, the sediment would then be bypassed by electric hydraulic dredge into the Pier 400 landfill area.) The support equipment for a trailing suction hopper dredge includes a 50-foot crew boat, a 25-foot survey boat, and buoys for marking off work areas.

Filling the hopper dredge with sediment is estimated to take approximately 46 minutes. Transport time from the dredge site to the placement sites would be approximately 80 to 135 minutes, depending on which site is used. Once the dredge arrives at the site, dumping would last approximately 15 minutes. At night, the dredge would be lit with high-intensity deck floodlights. These lights would shine down onto the deck of the dredge, which would also illuminate the water immediately surrounding the dredge. Measures to reduce turbidity at the material placement sites would include the following:

- At the dredge site, the hopper would be filled to the top with the sediment-water slurry mixture. The heavier material would settle to the bottom of the hopper, leaving several feet of muddy water on the top. This muddy water, containing much of the fine material, would be weired off to minimize the amount of fines deposited at the placement site.

- At the placement site, the hopper barge discharge would be performed quickly so that the dredged material would fall as a mass to minimize turbidity.

Landside construction for the additional crude oil storage tanks would include two phases: site preparation and site development. First, the site would be cleared by use of conventional heavy earth-moving equipment, i.e., six to eight pieces of equipment including backhoes and trucks. Second, the new tanks would be installed and pipes would be welded to existing facilities (e.g., other storage tanks).

3.4.2 Construction Timing

Construction of the proposed project is planned to start in 1997. Dredge activities and placement would occur 24 hours per day. Construction is estimated to vary between 16 and 22 months, depending on which placement sites are used.

Landside construction is estimated between 12 and 15 months overall. Site preparation is estimated at 3 to 4 months, and installation at 8 to 12 months.

3.4.3 Maintenance Dredging Requirements

It is anticipated that the deepened entrance channel will not require any periodic maintenance dredging because there is minimal littoral movement or sediment sources in the dredge area.

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the regulatory framework pertinent to the project and, by resource, describes the existing conditions in the project area and the environmental consequences of the proposed action.

The federal, state, and local regulatory framework of the proposed project related to the various environmental resources analyzed in this document is shown in Table 4.0-1. The regulations are summarized in Appendix B.

Table 4.0-1

APPLICABILITY OF FEDERAL, STATE, AND LOCAL REGULATIONS TO ENVIRONMENTAL RESOURCES
(page 1 of 2)

Regulation	*Geology*	*Oceanography & Water Quality*	*Marine Resources*	*Air Quality*	*Noise*	*Cultural Resources*	*Socio-economics*	*Land/ Water Use*	*Ground Transportation*	*Vessel Transportation*	*Energy*	*Aesthetics*
Federal Regulations												
Clean Air Act				X								
Clean Water Act	X	X	X					X				X
Coastal Zone Management Act	X	X	X	X	X	X	X	X	X	X	X	X
Endangered Species Act			X									
Executive Order 11593 (Protection and Enhancement of the Cultural Environment)						X						
Federal Water Project Recreation Act		X	X					X				
Fish and Wildlife Coordination Act			X									
Marine Mammal Protection Act			X									
Marine Protection, Research, and Sanctuaries Act		X										
Migratory Bird Conservation Act			X									
Migratory Bird Treaty Act			X									
National Environmental Compliance Act								X				X
National Environmental Policy Act; CEQ Regulations	X	X	X	X	X	X	X	X	X	X	X	X
National Historic Preservation Act						X						
Rivers and Harbors Act	X	X										
Submerged Lands Act	X	X	X	X	X	X	X	X	X	X	X	X
U.S. Army Corps of Engineers Regulation 1105-2-50 (Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies)		X						X				X

Table 4.0-1

APPLICABILITY OF FEDERAL, STATE, AND LOCAL REGULATIONS TO ENVIRONMENTAL RESOURCES
(page 2 of 2)

Regulation	*Geology*	*Oceanography & Water Quality*	*Marine Resources*	*Air Quality*	*Noise*	*Cultural Resources*	*Socio-economics*	*Land/Water Use*	*Ground Transportation*	*Vessel Transportation*	*Energy*	*Aesthetics*
State Regulations												
California Clean Air Act				X								
California Coastal Act	X	X	X	X	X	X	X	X	X	X	X	X
California Endangered Species Act			X									
California Environmental Quality Act	X	X	X	X	X	X	X	X	X	X	X	X
California Hazardous Waste Control Act	X											
Porter-Cologne Water Quality Control Act		X										
Local Regulations												
City of Long Beach Municipal Code					X							
City of Seal Beach Municipal Code					X							
Orange County Noise Ordinance					X							
South Coast Air Quality Management District Rules and Regulations				X								

4.1 TOPOGRAPHY AND GEOLOGY

4.1.1 Affected Environment

The project is located on the coast of the Los Angeles Basin, which lies within the seismically active southern California area. The Los Angeles Basin is a relatively flat alluvial plain bounded on the north by the Santa Monica Mountains, on the east by the Santa Ana Mountains and San Joaquin Hills, and on the south and west by the Pacific Ocean. The basin is underlain by a major structural depression that has been the site of deposition and subsidence since Miocene times (26 to 12 million years before present) and is notable for its relative complexity and prolific oil production (Port of Long Beach 1990b).

Topography/Bathymetry

Long Beach Harbor is located in San Pedro Bay, a natural embayment formed by a westerly protrusion of the coastline and the dominant onshore topographic feature, the Palos Verdes Peninsula. Deep channels and basins have been created by dredge and fill operations in the otherwise gradually sloping sediments that underlie the harbor. Outside of the engineered alterations to the bathymetry of Long Beach Harbor, the gentle slope of the ocean floor does not reach depths of 70 to 75 feet until more than 2 miles from Queen's Gate (EPA 1988). Throughout the project area, the extremely flat ocean floor slopes an average of one percent for the first 2,000 feet from the shoreline; slope then decreases to 0.3 percent for the next 3 miles seaward (COE 1978).

Seismicity and Major Faults

Southern California is recognized as one of the most seismically active areas in the United States. The region has been subjected to at least 52 major earthquakes of magnitude 6 (Richter Scale) or greater since 1796. Ground motion in the region is generally the result of sudden movements of large blocks of the Earth's crust along faults (Port of Long Beach 1990b).

Although the Los Angeles area is traversed by many faults, the three fault zones with the greatest importance to the project site are the Palos Verdes fault, 2.6 miles from the project, the Newport-Inglewood fault, 4.3 miles from the project site, and the San Andreas fault, 51 miles from the project site. During a major seismic event, these faults would likely be the centers of seismic activity in the area. According to Leighton and Associates (1990b), the estimated maximum credible earthquake for the Palos Verdes fault is magnitude 6.5, with a return interval of 1,500 to 3,000 years and a duration of 26 seconds in the project vicinity. The Newport-Inglewood fault is estimated to have a maximum credible earthquake of magnitude 6.5 to 7.0 with a return interval of 300 to 1,500 years and a duration of 26 seconds in the project vicinity. The San Andreas fault zone's maximum credible earthquake is magnitude 8.5 with a return interval of 160 to 300 years, but its distance from the project means that peak ground acceleration from this fault would be less than from the two dominant faults, the Palos Verdes and the Newport-Inglewood.

Sediments

In preparation for dredging, a geotechnical and chemical investigation of the Queen's Gate dredge area and potential placement sites was conducted. A total of 45 vibratory cores were collected, logged, and analyzed for chemical, geotechnical, and grain size parameters (see Figure 4.1-1). The following is a summary of those test results. See the Sea Surveyor, Inc. (1994) report or the Geotechnical Appendix to the Feasibility Study for additional details.

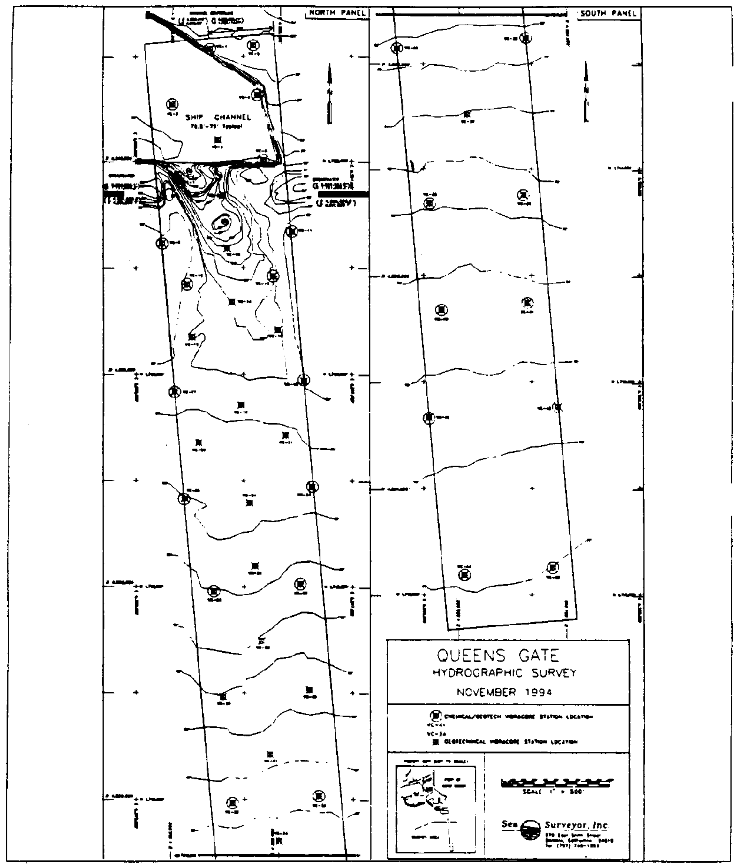


Figure 4.1-1. Locations of Chemical and Geotechnical Vibracore Samples in the Dredge Area

Physical Characteristics

Grain size analyses were conducted at vertical intervals of 3 feet (. In general, the stratigraphic description of the dredge area from the core sampling included two distinct zones. The upper zone or surface sediments were described as fine- to medium-grained sands with beds of shells or shell debris, thought to reflect mixing and deposition by storm waves (Sea Surveyor, Inc. 1994). Repetitive sequences of shell-rich horizons were interpreted as periodic storm wave depositional events alternating with more typical detrital (i.e., formed by mechanical weathering and transport) inner shelf silty sands. Below the surface sediments the stratigraphy was described as highly variable. Environments of deposition were interpreted as a mixture of: outer deltaic plain, low-energy clay and silt; beach sands of limited thickness and lateral extent; and inner shelf detrital sediments (Sea Surveyor, Inc. 1994).

The sediment grain size analyses conducted on samples from the proposed dredge area were evaluated by the LAD to determine suitability for the potential placement sites. Data were extrapolated across the dredge area to yield the generalized stratigraphic distribution (from the surface down) shown in Table 4.1-1 (COE 1995b). The sediment layers in the approach channel shown in Table 4.1-1 are not contiguous (i.e., not immediately adjacent) and total 5.3 mcy. The remaining 0.3 mcy are located in the main channel (i.e., inside Queen's Gate) and the channel bend area, and are assumed to be either sandy silt or silty sand. Material indicated as sand in the table is very fine grained (0.1 mm diameter), and has an *in-situ* silt content not exceeding 30 percent.

Table 4.1-1
Type and Quantity of Sediment Material by Layer at the Dredge Site

Sediment Layer	*Material Type*	*Quantity (mcy)*
1	Sand	1.8
2	Clay	0.4
3	Silt	1.5
4	Sand	0.4
5	Clay	0.2
6	Silt	0.3
7	Sand	0.4
8	Silt	0.3

Combining the quantities of like materials in Table 4.1-1, the estimated total volume of each type of material at the dredge site is: sand, 2.6 mcy (approximately 50 percent); clay, 0.6 mcy (approximately 10 percent); and silt, 2.1 mcy (approximately 40 percent). For the grain size analysis of the sediments at the potential placement sites, see the Geotechnical Appendix to the Feasibility Study.

Chemical Characteristics

Chemical analyses were conducted on a total of 56 composited subsamples from 28 of the sediment cores collected from the proposed dredge area (Sea Surveyor, Inc. 1994). Additionally, for comparison purposes, core samples were collected from the placement sites and analyzed for the same constituents as those collected from the dredge area. Comparisons of the chemical constituents detected in the dredge area sediments and those detected in sediments from the potential placement sites are presented in Table 4.1-2 (organic testing results) and Table 4.1-3 (metal testing results). The samples taken at Island White are considered representative of sediments in the Energy Island borrow pits adjacent to this island.

Table 4.1-2

SUMMARY OF ORGANIC TESTING RESULTS FOR SEDIMENTS AT THE DREDGE AREA, ISLAND WHITE, AND THE LA-2 OFFSHORE PLACEMENT SITE

	Dredge Area		Island White		LA-2	
	Range	*Average*	*Range*	*Average*	*Range*	*Average*
Total Organic Carbon (TOC) (%)	0.1-2.87	0.25-0.75	1.55-2.06	1.81	1.07-1.22	1.15
Total Polycyclic Aromatic Hydrocarbon (PAH) (μg/kg)	21-46 [b]	39	156-255	206	251-295	273
Total Phthalates (μg/kg)	21-590	25-75	552-1900	1226	152-214	183
Total Phenols (μg/kg)	NA	35 [a]	NA	ND	NA	50 [a]
Total Recoverable Petroleum Hydrocarbon (TRPH) (mg/kg)	11-93	10-60	710-1200	955	232-236	234
Butyltins (μg/kg)						
Monobutyltin (MBT)	NA	ND	3-7	5	NA	ND
Dibutyltin (DBT)	1-7	4	12-17	14.5	1-5	3
Tributyltin (TBT)	1-12	6.5	20-23	21.5	6-8	7
4,4'-DDE (Dichlorodiphenyl Dichloroethylene) (mg/kg)	0.02-0.1	0.02-0.05	NA	0.03	0.03-0.05	0.04
Total Polychlorinated Biphenyl (PCBs) (mg/kg)	0.01-0.02	0.01	0.1-0.17	0.135	0.04-0.05	0.045

Notes:
a. Detected in one sample.
b. Detected in four samples.
NA = Not applicable.
ND = Not detected.

Source: Sea Surveyor, Inc. 1994.

208

Table 4.1-3

SUMMARY OF METAL TESTING RESULTS FOR SEDIMENTS AT THE DREDGE AREA, ISLAND WHITE, AND THE LA-2 OFFSHORE PLACEMENT SITE

	DREDGE AREA		ISLAND WHITE		LA-2	
Metal	*Range*	*Average*	*Range*	*Average*	*Range*	*Average*
Arsenic	0.9-19.2	1-6	10.3-11.2	10.8	7.9-9.5	8.7
Cadmium	0.03-0.26	0.03-0.16	0.91-1.52	1.22	0.48-0.56	0.52
Chromium	6.7-42.1	11-25	46.5-47.9	47.2	32.1-37.6	34.9
Copper	4.34-41.9	5-20	60-66.1	63.05	33.5-39.1	36.3
Lead	1.81-16.6	3-9	118-144	131	43.4-46.1	44.75
Mercury	0.02-0.17	0.02-0.06	NA	0.24 [a]	0.17-0.19	0.18
Nickel	5.3-29.7	6-17	31.7-34.7	33	20.5-24.2	22.4
Selenium	0.05-0.06 [b]	0.05	0.09-1.2	1.05	NA	ND
Silver	0.02-0.17	0.02-0.07	0.37-0.41	0.39	0.25-0.3	0.28
Zinc	20.7-90.9	25-55	190-220	205	94.1-123	108.6

Notes:
a. Detected in one sample.
b. Detected in four samples.
NA = Not applicable.
ND = Not detected.

Source: Sea Surveyor, Inc. 1994.

209

Based on these analyses and comparison between the dredge area sediments and those of the potential placement sites, the Corps and EPA (personal communication, John Amdur 1995) have concluded that the dredge area sediments are cleaner than those at the potential placement areas and are suitable for ocean disposal. This determination is based on the following conclusions from the Sea Surveyor, Inc. (1994) analysis:

- Dredge area sediment contaminant concentrations are below those suspected of causing biological effects for the analytes tested, except bis(2-ethylhexyl)phthalate (did not exceed NOAA ER-M levels [Long and Morgan 1990]). Bis(2-ethylhexyl)phthalate was detected in all sediments, including laboratory blanks. The presence of bis(2-ethylhexyl)phthalate in nearly all samples can be attributed to laboratory contamination.

- Dredge area sediment contaminant concentrations are comparable (same order of magnitude) to sediments collected from LA-2 and were much lower than those measured in Island White sediments (difference of about a magnitude).

- Based on the evaluation of chemical contaminants only, dredge area sediments are considered acceptable for placement at the borrow pit sites or LA-2.

4.1.2 Impact Significance Criteria

Impacts from the proposed dredging and disposal of dredged material would be considered significant if any one or a combination of the following occurred:

- Unique geologic features were adversely affected;

- A geologic feature of unusual scientific value for study or interpretation were disturbed;

- Known mineral resources were rendered inaccessible;

- Geologic processes such as landsliding or erosion were triggered or accelerated; or

- Substantial alteration of topography occurred.

4.1.3 Construction Impacts

4.1.3.1 The Dredge Area

The channel deepening would alter local bathymetry. The proposed channel side slope inclinations for the project have been designed to maintain stability and have been determined in accordance with recommendations based on geotechnical investigations of the project area and accepted engineering practice. The potential for side-slope failure along the margins of the channel is limited, although this potential would increase in the event of a moderate or stronger seismic event in the vicinity of the project. Such potential side-slope failures would not be considered a significant impact. Due to the local oceanic conditions (section 4.2.1), periodic maintenance dredging is not expected.

4.1.3.2 Placement Options

Landfill in the Port of Los Angeles

The POLA has determined that the quality and physical characteristics of the top layer of sediments in the dredge area (2.0 mcy of silty sand) are suitable for placement in an existing "footprint" of the Pier 400 landfill (see letter from POLA dated March 7, 1995, in Appendix A). The creation of Pier 400 is a permanent topographic alteration that has already been evaluated in the Final Environmental Impact Statement/Report for the Deep Draft Navigation Improvements project (COE and LAHD 1992). There would be no impact on topography or geology from transporting the sediment to this site.

Borrow Pits

The use of any of the borrow pits for the placement of dredged material would result in a topographic alteration (i.e., the partial or complete infilling of one or more of the borrow areas). As man-made features, infilling of these borrow areas would return the affected area to a more natural condition and make the bottom topography more even, a beneficial effect on the bottom topography. Filling the Main Channel pit would restore the navigation channel in this area to its optimum depth, would eliminate the potential for slumping of sediments in this area, and would thus improve the channel's stability.

The existing pits near Island White are the result of excavation and placement of bottom sediments for the construction of the Energy Islands (Grissom, White, Freeman, and Chaffee) in the 1960s. The combined total capacity of the two Energy Island pits could more than accommodate the total estimated 5.6 mcy of material to be dredged as part of this project.

Impacts from a seismic event on a local or regional scale would be limited to settlement of the material. No structures are proposed on or near either of the borrow pit areas, so no impacts would occur due to potential settlement. Sediment grain size differences between the dredged material and existing sediments in the pits have the potential to affect the benthic biota at the site, although the impact would be insignificant. For further discussion, see section 4.3.3.2.

LA-2

Use of the LA-2 site for the placement of dredged material was evaluated in the Final EIS for the Los Angeles/Long Beach (LA-2) Ocean Dredged Material Disposal Site (ODMDS) Designation (EPA 1988). It was determined that placement of dredged material at this site would lead to the accumulation of sediment on the slope between the mainland shelf and the San Pedro Basin. This sediment accumulation could lead to slumping of material down the slope's gradient. As a natural occurrence and important process in transporting sediments to the deeper ocean basins, additional slumping caused by the placement of dredged material is considered insignificant.

4.1.3.3 Ancillary Facilities

Crude Oil Storage Tanks

The potential geologic impacts that would be expected from above-ground storage tanks would be those associated with construction and use of the tanks. Construction impacts would be short term (during the 12- to 15-month construction period) and could include erosion and sedimentation impacts from earthmoving activities. Although operation or use of the tanks would increase the risk from pipe or tank rupture due to the secondary effects of a significant seismic event such as strong ground motion or liquefaction, these tanks would be designed and constructed in accordance with standard engineering practices.

Staging Area

No geologic impacts are anticipated from the use of the Navy Base Mole Pier as a staging area for dredging activities.

4.1.4 Long-Term Impacts

The only long-term impact of the project would be the risk of rupture of the crude oil storage tanks or associated piping from a significant seismic event such as strong ground motion or liquefaction. To minimize this potential impact, these tanks would be designed and constructed in accordance with standard engineering practices.

4.2 OCEANOGRAPHY AND WATER QUALITY

Oceanographic resources for this project include San Pedro Bay and the adjacent Pacific Ocean. Physical oceanographic parameters relevant to the proposed project are tides, currents, and waves. Water quality parameters to be addressed include dissolved oxygen (DO), temperature, salinity, pH, transparency, nutrients, and metals and organic chemicals. Both physical and chemical oceanographic parameters have been studied extensively in San Pedro Bay since the 1970s using field surveys and modeling. Relevant literature has been summarized here (COE and LAHD 1980, 1992; COE 1984a, b, c; LAHD and BLM 1985).

4.2.1 Affected Environment

The region of influence for this project comprises the Los Angeles-Long Beach Outer Harbor, nearshore waters east from the Harbor to the mouth of Alamitos Bay, and the Pacific Ocean within 3 miles of Queen's Gate and within 2 miles of the LA-2 site. Physical and chemical oceanographic characteristics are expected to be similar throughout much of the project area, with some differences at the deep water LA-2 site.

The project is located in a marine environment that has been physically modified through past dredging and filling projects as well as construction of breakwaters and other structures. These structural changes along with intensive human use of the area have altered the chemical oceanographic character of the harbor area. The Los Angeles River, the San Gabriel River, and Dominguez Channel are the primary sources of freshwater inflow in the project vicinity, with most flow occurring during winter and spring from storm runoff. Storm flows also contribute to turbidity in the harbor area. Flow in these rivers has been greatly altered through flood control projects and discharges. Such changes are complex. Discharges add water, while diversions and spreading basins decrease flow. Channelization and urbanization in the watershed alter runoff hydrograph by increasing peak flow as well as shifting the peak to earlier.

Water circulation within the breakwaters results primarily from tidal action while circulation outside the breakwaters is influenced by tides and long-shore currents, such as the California Current and Southern California Counter Current. Current patterns, especially near shore, are complex and continually changing. Winds and bottom topography also influence surface currents (EPA 1988).

Surface currents outside the harbor in the San Pedro Channel are influenced by tides and winds. Deeper currents are influenced by tides, the California Undercurrent (at depths of about 1,600 feet), and basin topography. Surface currents generally change direction progressively in a clockwise direction throughout the day. Net currents (per month) ranged from 0.56 feet per second (fps) southeastward to 0.26 fps northwestward (SCCWRP 1973). Upwelling (rise of bottom waters to the surface) occurs along the coast, generally in localized areas, as a result of winds blowing surface waters away from shore. The most intense period of upwelling is April through June.

Tides in the Los Angeles-Long Beach Harbor area are mixed semi-diurnal with two low tides and two high tides per tidal day (25 hours). The mean tide range is 3.8 feet, the mean diurnal range is 5.6 feet, and the maximum range is 10 feet (McAnally 1975).

Harbor circulation and flushing have been summarized in the Deep Draft Navigation Improvements Project EIS/EIR (COE and LAHD 1992). Physical and numerical modeling studies of the Los Angeles-Long Beach Harbor indicate that tidal circulation results in a net inflow through Angel's Gate and

Queen's Gate and a net outflow eastward between the Long Beach Breakwater and the coastline at Seal Beach. The modeled maximum velocity (depth averaged) at Queen's Gate is 1.08 fps. This may be an underestimate since the modeled velocities (McAnally 1975) were lower than measured surface velocities (Smith 1989) at Angel's Gate, Long Beach Main Channel, and the harbor east entrance. A large clockwise gyre occurs in the Los Angeles Outer Harbor with a smaller counterclockwise eddy at Queen's Gate. The flushing rate for the Los Angeles-Long Beach Harbor is estimated to be 90 tidal cycles. Modeling studies for the harbor show that current velocities at the proposed disposal sites during maximum ebb and flood tides are approximately 0.03 fps. Velocities increase northward into the Los Angeles River mouth and to the southeast of Island White (COE 1994d).

Waves in the project area are generated by local winds, offshore winds, and distant storm or seismic activity (tsunamis). Wave heights within the harbor are generally 1 to 2 feet (COE 1994d). Waves generated offshore by winds have a west to southwest direction, wave heights outside the breakwaters of less than 6 feet, and a maximum period of 10 seconds (LAHD and BLM 1985). Long-period waves (> 10 sec) originate from distant storms or seismic events. These waves are classified as northern hemisphere swell or southern hemisphere swell, depending on their direction of approach.

Current sources of pollutants to San Pedro Bay include storm runoff from residential and industrial areas that enter via the Los Angeles River and Dominguez Channel, Terminal Island Treatment Plant discharges, storm drain discharges, vessel maintenance, and accidental spills. Water quality outside the harbors is influenced by water flushed from the harbors and vessel activity.

Dissolved Oxygen (DO)

DO is a good indicator of water quality. Past studies have shown that concentrations vary considerably throughout the harbor by area, depth, and season. A large number of factors influence DO concentrations, including:

- Abundance of living plants (photosynthesis) and animals (respiration);
- Waste discharges rich in biochemical oxygen demand (BOD);
- Bottom disturbances that expose anoxic sediments;
- Surface water mixing;
- Water flushing rates (circulation patterns); and
- Salinity and temperature.

Surface waters in the ocean are usually saturated with oxygen, and concentrations decrease with depth. Average concentrations near the LA-2 site were 5.5 to 5.9 mg/l at the surface and 1.8 to 2.2 mg/l at a depth of 660 feet (EPA 1988). Samples taken in the vicinity of LA-2 in 1983-84 showed surface DO concentrations of 7.5 to 13.2 mg/l (EPA 1988) and are more representative of natural conditions in the open ocean. In the San Pedro Basin, located adjacent to the LA-2 site, DO values as low as 0.2 mg/l have been measured at depths below 2,400 feet (the depth of the LA-2 site varies from 387 to 1,050 feet).

Since enactment of water quality regulations in 1970, average yearly DO concentrations throughout the harbors have generally remained above 5 mg/l (the Regional Water Quality Control Board [RWQCB] recommended standard). Localized reductions in DO, however, still occur occasionally. These localized, short-term reductions of DO are usually due to decomposition of phytoplankton following bloom conditions. A "red tide" (high density of phytoplankton) that has been observed in the harbor during summer months is attributed to conditions of intense solar radiation and nutrient-rich waters (COE and LAHD 1992).

Temperature

Surface water temperatures in the project area are highest from August through September and lowest between December and February. In shallow water areas, temperatures ranged from 14.3 to 22.3°C in 1980-83 (EPA 1988). Temperatures at depths of 420 to 1,020 feet near the LA-2 site were 7.9 to 11.0°C in 1983-84. Annual average temperatures in Los Angeles Harbor showed little variation from 1967 through 1991, and similar conditions would be expected for Long Beach Harbor. Surface waters ranged from 13.7 to 20.0°C. At a depth of 20 feet below the water surface, temperatures were slightly lower with ranges from 13.5 to 19.2°C (POLA 1991). Measurements in Long Beach Harbor near Queen's Gate ranged from 14.4 to 21.2°C (MBC 1984).

pH

In southern California coastal waters near the LA-2 site, pH has been found to range from 7.5 to 8.6 (EPA 1988). The pH generally decreases with depth, and a value of 7.5 has been reported for the oxygen-minimum layer in the offshore basins. Harbor waters generally have a pH of 7.0 to 8.7 with higher values at the surface during warmer periods than in cooler, deeper waters (COE and LAHD 1992). Samples from 1993-94 ranged from 7.37 to 8.25 for Queensway Bay (MBC 1994). A range of 6.5 to 8.5 has been established by the Los Angeles RWQCB for enclosed bays and estuaries.

Salinity

The salinity of ocean water remains relatively constant. In surface waters (upper 50 feet), salinity is influenced primarily by evaporation and precipitation. Freshwater runoff from land and upwelling also influences salinity in coastal waters (SCCWRP 1973). Values measured across the San Pedro Channel (as well as vertically) in the vicinity of the LA-2 site ranged from 32.9 to 34.5 parts per thousand (ppt) (EPA 1988). Salinity within the harbors is generally between 30.0 and 34.2 ppt, although extremes of 10.0 ppt and 39.0 ppt have been reported (COE 1984a). Measurements in 1983-84 near Queen's Gate ranged from 33.7 to 34.2 ppt (MBC 1984). In Queensway Bay, salinity ranged from 24.1 in January 1994 to 6.9 in February (MBC 1994).

Transparency

Water transparency is influenced by the presence of suspended organic and inorganic material. Organic material includes plankton and materials from land-based discharges while inorganic material is primarily sediments. Waves and currents may suspend sediments in shallow waters and can transport suspended materials away from their place of origin. Transparency measured in waters outside the harbors ranged from 8.5 to 42.7 feet (Tekmarine 1987). Annual average values for Los Angeles Harbor ranged from 2.0 to 24.4 feet with most values between 6.0 and 9.0 feet (POLA 1987 and 1988).

Nutrients

Concentrations of nitrate in open ocean surface waters, such as at the LA-2 site, range from 0.01 to 0.16 mg/l; at depths of 300 feet, the range is 0.2 to 0.4 mg/l (SCCWRP 1973). Phosphate concentrations range from 0.5 to 0.8 mg/l in surface waters and increase to about 3.0 mg/l at a depth of 1,650 feet (EPA 1988). Inorganic nutrient concentrations in harbor waters ranged from 0.12 to 119.28 mg/l for ammonia, 0.0 to 5.38 mg/l for nitrite, 0.0 to 82.97 mg/l for nitrate, and 0.17 to 12.39 mg/l for phosphate in 1978 (COE 1984a). Concentrations tend to be lower in summer when photosynthetic activity is greatest and higher in winter when day length is shortest and runoff from precipitation is increased. Nutrient concentrations in harbor waters can be fairly high at times, based on the upper ranges given here. High nutrient levels are not good if they cause eutrophication with large booms and crashes of plankton.

Metals and Organic Chemicals

Trace metal concentrations in coastal waters are elevated by industrial and municipal wastewater discharges and urban stormwater runoff. Some of these metals are essential for metabolic processes in aquatic organisms, but at higher concentrations these metals can be directly toxic or bioaccumulated to toxic levels. Table 4.2-1 shows the concentrations of trace metals measured in waters near Queen's Gate and in the open ocean along with the applicable water quality goals. Waters near Queen's Gate meet these goals for enclosed bays and estuaries, but copper can exceed the daily maximum at times. Offshore waters also meet the goals, although lead and mercury concentrations can exceed the daily maximum.

Table 4.2-1
Trace Metal Concentrations and Water Quality Goals (μg/l)

	Queen's Gate [1]	*Offshore Waters* [2]	ENCLOSED BAYS AND ESTUARIES PLAN [3]		OCEAN PLAN [3]
			4-Day Ave.	*Daily Max.*	*Daily Max.*
Arsenic	< 1.0	—	36	69	32
Cadmium	<0.05	0.1	9.3	43	4
Chromium	1.9	0.2-0.5	50	1,100	8
Copper	8.7	0.4-9.0	—	2.9	12
Lead	0.21	0.4-18.2	5.6	140	8
Mercury	<0.1	0.03-0.2	—	2.1	0.16
Nickel	<0.2	0.4-2.5	8.3	75	20
Silver	<0.05	0.06-0.96	—	2.3	2.8
Zinc	6.2	1.1-41.2	86	95	80

Notes:
1. ToxScan 1988.
2. SCCWRP 1973.
3. Marshack 1991.

Tributyltin (TBT), an active biocide in marine anti-fouling paints, has also been found in harbor waters, particularly in areas of commercial and private vessel moorage and repair facilities (COE and LAHD 1992). In 1986, surface water concentrations in Los Angeles-Long Beach Harbor ranged from 3 nanograms per liter (ng/l) to 119 ng/l. Another study found TBT concentrations in Long Beach Harbor to range from 17 to 140 ng/l (California WRCB 1988). State regulations currently limit use of TBT paints to vessels greater than 82 feet in length. Thus, current levels of TBT in harbor waters should be lower than those reported here, which were measured prior to the restrictions.

Chemical analyses were conducted on sediment core samples collected from the dredge area and from potential placement sites (Sea Surveyor, Inc. 1994). Comparisons of the chemical constituents detected in sediments from the dredge and placement areas are shown in Table 4.1-2 (organic testing results) and Table 4.1-3 (metal testing results). Based on these comparisons, the LAD and EPA (personal communication, John Amdur 1995) have concluded that the dredge area sediments have lower levels of chemical contaminants than those at the potential placement areas and are suitable for ocean disposal. See section 4.1.1 and the Geotechnical Appendix to the Feasibility Study for additional detail.

4.2.2 Impact Significance Criteria

Impacts would be considered significant if the proposed project would cause one or more of the following:

- Alteration of water quality resulting in deleterious effects on human, animal, or plant life (even if no formal water quality criteria are violated).
- Exceedance of water quality objectives in the California Enclosed Bays and Estuaries Plan (California WRCB 1991) within Long Beach Harbor, the Ocean Plan (Marshack 1991) outside the harbor, or RWQCB certification conditions. Water quality goals for metals are shown in Table 4.2-1.
- Creation of pollution, contamination, or a nuisance as defined in Section 13050 of the California Water Code.
- Impairment of beneficial uses of nearshore waters as identified in the Water Quality Control Plan for the Los Angeles River Basin (California RWQCB 1978).

Water or sediment quality impacts would be considered significant for regional violations, not for small changes that occur in a localized area for brief periods of time (a few days).

4.2.3 Construction Impacts

4.2.3.1 The Dredge Area

Dredging the approach channel to Queen's Gate to a depth of 76 feet below MLLW would have negligible effects on water circulation. Bottom current patterns could be modified slightly in the immediate vicinity of the channel, but overall current patterns would not be changed. The deeper channel would not alter waves caused by winds and would have minimal effects on deep-water waves approaching San Pedro Bay.

Water quality would be temporarily affected during the dredging process, primarily through turbidity. Decreases in DO, increases in nutrients, and increases in suspended and dissolved metals and organic chemicals could also occur. The project is expected to have no impacts on pH, salinity, or water temperature. Excavation with a hopper dredge would resuspend silt, clays, and organic material in the bottom sediments. A relatively small turbidity plume would be expected near the bottom where sediments are being suctioned up to the hopper dredge. A larger turbidity plume would likely occur in surface waters around the dredge, resulting primarily from over-filling the hopper and the draining (weiring) of water containing suspended fine sediments. The plume from hopper dredging in which suspended solids concentrations exceed background levels can extend between 1,000 and 4,000 feet from the dredge (Herbich and Brahme 1983). Depending on the wave environment, turbidity may extend beyond 4,000 feet as well. The plume would follow water currents and may enter San Pedro Bay through Queen's Gate, when the dredge is located near the gate, as a result of tidal currents. The duration of the turbidity plume is generally short, with the concentration of suspended solids returning to background levels within one to 24 hours after dredging stops (Parish and Weiner 1987; LAHD observations). The turbidity plume would partially dissipate while the hopper dredge is away from the dredge site to discharge the load of material at one of the placement sites. Dredging is planned to continue for about 16 to 22 months so that impacts would occur over that time, and the location of the plume would vary with the location of the dredge and short-term, local current patterns. Impacts on water quality are expected to be intermittent over the 16 to 22 months of dredging, localized to the vicinity of the dredge, and not significant because dredging activities would be conducted subject to the controls of the RWQCB permit for this project.

Turbidity from dredging has the potential to decrease DO in the immediate vicinity (within about 300 feet) of the dredge. Since the dredging would be conducted in open waters outside San Pedro Bay where DO levels are normally above 5 mg/l, the potential for decreasing DO to below that level are slight. In the unlikely event that DO was reduced to below 5 mg/l, the exceedance of water quality criteria would be of short duration and would be over a small area at the dredge location. Long-term exceedances are not expected and impacts on marine life would be insignificant (see section 4.3.2).

Nutrients released from the sediments could add to the concentrations present in local waters. Dilution with water moving through the dredge site as a result of tides and currents, however, would dilute the concentrations and disperse the nutrients. These nutrients would be available to plankton for uptake and growth. The small amount of nutrients that could be released and their dispersion over the area are not expected to cause any plankton blooms.

Metals and organic chemicals in the sediments can be released to the water during resuspension of the sediments. Most of these substances, however, have a very low solubility in water, are adsorbed to the sediments, and would not be released to the water. More soluble metals, such as zinc and nickel, could be released, but the Ocean Plan water quality goals for these metals are relatively high (see Table 4.2-1). Sediment sampling in the dredge area has shown that the sediments do not contain high concentrations of organic chemicals or metals (see section 4.1, tables 4.1-2 and 4.1-3, respectively). Thus, release of metals or organic chemicals from resuspended sediments during dredging is expected to have no significant impacts on water quality.

4.2.3.2 Placement Options

Landfill in the Port of Los Angeles

Transport of up to 2.0 mcy of dredged material to the POLA for placement in the Pier 400 landfill would have no impacts on water quality. Impacts resulting from dredging and placement of fill for the Pier 400 project have been addressed under separate environmental documentation (COE and LAHD 1992). Implementation of the applicable mitigation measures for material placement, as identified in the DDNI Project EIS/R (COE and LAHD 1992), would be the responsibility of the POLA.

Borrow Pits

Main Channel Borrow Pit

Placement of the dredged material in the Long Beach Main Channel borrow pit would raise the bottom from 90 feet to 80 feet below MLLW; this elevation would match that of the adjacent channel. This would have negligible impacts on water circulation and waves in Long Beach Harbor.

Discharge of the sediments into the pit by dumping from the bottom of the hopper dredge would result in turbidity plumes extending down current from the placement site. About eight loads would be discharged per day over a period of about 5 months when the pit would be filled. The remainder of the material would then be placed in one of the other sites. Placement by dumping from the bottom of the dredge would likely result in a turbidity plume smaller than that expected to be produced by the hopper dredge since some of the fine material would be drained (weired) off at the dredging site. The plume is expected to extend between 500 and 1,000 feet from the placement site, and would sink with time and distance from the point of origin (Moffat & Nichol 1995, COE 1992a and 1995d). Under intense wave conditions, turbidity may extend 4,000 feet from the placement site. High wave action would tend to increase mixing and dilution of the plume while currents, some induced by wind, would elongate the plume. The extent of the plume would depend on factors such as composition (grain size) of the sediments dredged in each load and the time interval between the end of hopper filling and draining of the water (i.e., the settling time).

Tidal currents in the long Beach Main Channel are weak. The placement site is located at the eastern edge of the central gyre in the Outer Harbor. Current patterns would carry the turbidity plume south and west in the gyre as well as north into the Inner Harbor at various times during the tidal cycle. Flushing by entry of the oceanic water on flood tides and exit of water on ebb tides would aid in dilution and dispersion of the turbid waters.

Modeling of a single hopper dredge discharge event (fine sand and silt at a 1:1 ratio) into water 50 feet deep with a current of 0.1 fps indicated that the concentration of suspended solids (turbidity) increased rapidly with depth (Johnson 1990). After 3 hours, turbidity was shown to decrease substantially, particularly at greater depths. Placement of the dredged material would result in localized turbidity. This would have short term (intermittent) impacts on water quality that would be adverse but not significant because placement activities would be conducted subject to the controls of the RWQCB permit for this project.

Placement of the dredged material in the borrow pit is not expected to reduce DO concentrations to below 5 mg/l. Release of nutrients, metals, and organic chemicals from the settling dredged material is expected to have negligible impacts on water quality considering the relatively low concentrations of these substances found in the sediments to be dredged (see section 4.1).

Energy Island Borrow Pits

Disposal of the dredged material in either the north or southeast borrow pit would have minimal effects on water circulation and waves. Placement of the sediments in either or both pits would raise the bottom elevation from 60 feet to approximately 30 feet below MLLW. This could slightly alter the waves and bottom currents in the pit area, but impacts would not be significant.

The turbidity plume resulting from discharge of the dredged materials into the borrow pit would be similar to that described for the Long Beach Main Channel borrow pit. The period of discharge, however, would be about 16 months if the north pit were used and about 4 months if the southeast pit were used.

The borrow pit is located within the breakwaters where tidal currents would tend to disperse the turbidity. Modeling studies have shown that tidal currents in the vicinity of this area are weak (about 0.03 fps). Thus, dispersal of turbidity by currents would be low. The net transport in this area is eastward, so the plume would tend to extend in that direction. Because the sediment will be deposited into a pit in an area with a low energy wave climate, the dredged sediment is not expected to be transported to the beach area. With intervals of 2 to 3 hours between discharge events, a major portion of the suspended material would settle out and the plume would sink with distance from the site. Impacts on water quality would be local and not significant for the reasons described for the Long Beach Main Channel site.

As described for the dredging site, reduction in DO is not expected to result in concentrations less than 5 mg/l and would not adversely affect marine life.

Fine sediments and flocculent material in the borrow pit would be resuspended as the first loads of dredged material hit the bottom. Release of nutrients, metals, and organic chemicals from resuspended pit sediments or the dredged material would likely remain in the local area and would have no significant impacts on water quality. Nutrients would be rapidly diluted and dispersed by local currents. The added nutrients would not be sufficient to cause plankton blooms. Most of the metals and organic chemicals would remain adsorbed to the sediment particles and would settle to the bottom. Thus, water quality would not be adversely affected. Placement of sediments in the pits that are cleaner than the existing pit sediments would function as a cap that would have long-term benefits for marine life (see section 4.3).

LA-2

Disposal of the dredged material in the offshore LA-2 site would result in turbidity impacts similar to those described for the Energy Island borrow pits. The location, however, would be farther offshore where oceanic currents would aid in dilution and dispersal of the plume. In addition, the number of discharges per day would decrease to five or six due to the greater distance from the dredge site. As a result, the disposal period would be increased to about 22 months. Turbidity impacts on water quality would be insignificant due to dispersion by currents and the time interval between discharges. Impacts of nutrients, metals, and organic chemicals released from the dredged sediments as they settle to the bottom would not be significant for the reasons described above for the Energy Island borrow pits.

Waves and currents would not be altered by the disposal of dredged material at the LA-2 site. Release of nutrients, metals, and organic chemicals would not have any adverse effects on water quality.

4.2.3.3 Ancillary Facilities

Crude Oil Storage Tanks

Construction and operation of the storage tanks at the ARCO site would have no impact on water quality. Construction activities would be located on an upland site with no activities in or near harbor waters. Oceanographic resources would not be affected.

Staging Area

Use of a storage area on the Naval Mole would not affect water quality or oceanographic resources.

4.2.4 Long-Term Impacts

There would be no long-term impacts of the project on oceanography and water quality.

4.3 MARINE RESOURCES

Marine resources include marine biota (plants and animals) and the habitats in which they occur. Commercial harvest of these resources is also included in this section. Marine habitats are classified as benthic (bottom) and pelagic (water column). These can be further defined by depth (e.g., intertidal, shallow water, and deep water) and/or substrate (e.g., soft bottom and hard substrates). Water-associated birds as well as species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS), species having equivalent status at the state level, species under consideration for listing as threatened or endangered, and other special status species (e.g., marine mammals protected under the Marine Mammal Protection Act) are also discussed in this section.

4.3.1 Affected Environment

The region of influence (the area that could potentially be affected) encompasses the marine environment of San Pedro Bay and oceanic waters to about 3 miles south of Queen's Gate and within about 2 miles of the LA-2 dump site.

Biological resources within the region of influence, and particularly within Long Beach Harbor, have been extensively studied for at least 20 years. The information for the harbor has been summarized from 1983-84 surveys (MBC 1984) and 1994 surveys (MEC unpublished data). Commercial fishing information was obtained from the California Department of Fish and Game (CDFG).

Biological Resources

The natural environment within Long Beach Harbor and eastward along the coast has changed substantially over the past 100 years, due primarily to harbor development, flood control, navigation improvements, and urbanization/industrialization of the surrounding area. Breakwater construction, dredge and fill activities, and construction of structures such as oil islands and harbor facilities (e.g., piers and wharves) have both altered the natural physical environment and created artificial habitats that support a high diversity of biological communities. Water quality has been degraded by these developments and by pollutant discharges that enter primarily via the Los Angeles River, San Gabriel River, Dominguez Channel, and storm drains, but regulations have decreased such pollution inputs in recent years and water quality continues to improve.

Several special concern species are known to occur in the vicinity of the project area. These include species listed as threatened or endangered (state and federal) and marine mammals. Table 4.3-1 lists the special concern species known or expected to occur in the project area, their state and federal status, and information on occurrence in the project area. Additional species of marine mammals may pass through the area but are not included in the table due to the low frequency of occurrence in the project area. The USFWS, in their Planning Aid Letter (22 December 1994), discussed several additional listed and candidate species as well as other special interest species (see Appendix A). Since that letter was written, the project has been modified, eliminating the beach placement sites. Thus, habitat for species such as the western snowy plover (*Charadrius alexandrinus nivosus*), Pismo clam (*Tivela stultorum*), and grunion (*Leuresthes tenuis*) would not be affected by the proposed project, and they are not included in the analysis. The two listed species of primary concern are the California least tern (*Sterna antillarum browni*) and California brown pelican (*Pelicanus occidentalis occidentalis*) because both species are known to use the harbor area regularly. Additional information for these two species is provided below. None of the special status species, except the least tern, breed in the project area.

Table 4.3-1

SPECIAL STATUS SPECIES IN THE PROJECT AREA
(page 1 of 2)

	Status [1]			
Species	*Federal*	*State*	*Remarks*	*Occurrence* [2]
California least tern *Sterna antillarum browni*	E	E	Nests on Terminal Island; present April through August. Forages over shallow waters in the harbor and near the Middle Breakwater.	C
California brown pelican *Pelicanus occidentalis occidentalis*	E	E	Rests on Middle Breakwater and forages over open waters. Peak abundance July-November. No nesting in project area.	C
American peregrine falcon *Falco peregrinus*	E	E	Very rare visitor to harbor area; one observation at Shoreline Aquatic Park in 1983-84 survey.	R
Western snowy plover *Charadrius alexandrinus nivosus*	T	CSC	Rare visitor to harbor area sandy beaches; no nesting in or near project area.	R
California sea lion *Zalophus californianus*	P	—	Occasionally in harbor area; may haul out on breakwaters, but no breeding in project area.	U
Harbor seal *Phoca vitulina*	P	—	Sporadically present in harbor area; no breeding in project area.	U
Common dolphin *Delphinus delphis*	P	—	Occasional visitor in harbor; more common in coastal waters.	U
Pacific white-sided dolphin *Lagenorhynchus obliquidens*	P	—	Occasional visitor in harbor; more common in coastal waters.	U
Gray whale *Eschrichtius robustus*	E	E	Migrates along coastline from Bering Sea to Baja California to breed each year, passing through LA-2 area.	R
Pacific bottlenose dolphin *Tursiops truncatus*	P	—	Common in coastal waters; observed just outside breakwaters.	C
Blue whale *Balaeonoptera musculus*	E	—	Winter visitor in offshore waters; may pass through LA-2 area.	U
Finback whale *Balaeonoptera physalus*	E	—	Visitor in offshore waters; may pass through LA-2 area.	U
Sei whale *Balaeonoptera borealis*	E	---	Winter visitor in offshore waters; may pass through LA-2 area.	U

Table 4.3-1

SPECIAL STATUS SPECIES IN THE PROJECT AREA
(page 2 of 2)

	STATUS [1]			
Species	*Federal*	*State*	*Remarks*	*Occurrence* [2]
Humpback whale *Megaptera novaengliae*	E	—	Summer visitor in offshore waters; may pass through LA-2 area.	U
Right whale *Balaena glacialis*	E	—	Rare visitor in offshore waters; may pass through LA-2 area.	R
Sperm whale *Physeter catondon*	E	—	Migrant visitor in deep offshore waters; may pass through LA-2 area.	R
Leatherback turtle *Dermochelys coriacea sechlegeli*	E	—	Uncommon in offshore waters.	U
Loggerhead sea turtle *Caretta caretta*	T	—	Uncommon in offshore waters.	U
Green sea turtle *Chelonia mydas*	T	—	Offshore waters; rare visitor to project area that has been observed near Alamitos Bay.	R
Pacific Ridley's turtle *Lepidochelys olivacea*	T	—	Rare offshore visitor.	R

Notes: 1. E = Endangered
T = Threatened
P = Protected under Marine Mammal Act
CSC = California special concern species
2. Estimated probability of occurrence in the project area
C = Common
U = Uncommon
R = Rare

Source: MBC 1984; EPA 1988; MEC 1988; LAHD and BLM 1985; COE and LAHD 1990.

The marine mammals and sea turtles are very mobile, and most occur infrequently within the project area, particularly at the dredging site and nearshore disposal sites. They may be transient visitors at the LA-2 site.

California Least Tern

The California least tern migrates to southern and central California in the spring to breed, arriving in early to mid-April. The terns generally depart for their wintering grounds in August. Of the two tern colonies in the region (see Figure 4.3-1), the closest one is located on Terminal Island approximately 4 miles from Queen's Gate. This nesting site was established in the southeastern corner of Pier 300 in 1987 but has been moved northward to near the Seaplane Anchorage through a Relocation Plan undertaken by the POLA (Lemke 1989) under a memorandum of agreement (MOA) with the USFWS and the CDFG, as amended in 1991. A permanent relocation of the colony nesting site away from areas to be developed is still being considered (see mitigation plan in Appendix B of the DDNI EIS/R [COE and LAHD 1992]). The other colony is located at Seal Beach National Wildlife Refuge, more than 5 miles from Queen's Gate.

The number of nesting pairs in the Terminal Island colony and their reproductive success have fluctuated considerably from year to year. The number of nesting pairs ranged from 0 in 1978 to 109 in 1984, and the average number of fledglings per pair varied from 0.13 in 1987 to 1.5 in 1975 (Keane 1986, 1987). This variability is related in part to the influence of predation on eggs, chicks, and adults by American crows, American kestrels, and feral cats as well as to changing levels of human activity at the nesting sites. Terminal Island is sometimes used as a renesting site for least terns from other colonies and occasionally serves as a postbreeding congregation area (Massey and Atwood 1985).

Adult California least terns observed in the Outer Harbor in 1986 and 1987 fed primarily in shallow water areas adjacent to Terminal Island, although some were observed feeding just inside the Middle Breakwater (MEC 1988). After chicks hatched, foraging was more concentrated in the shallow waters (less than 20 feet deep) adjacent to the colony. Harbor Lake, located about 4.5 miles north of Terminal Island, is also used as a foraging area and post-season congregating area by the terns where the young birds can develop their feeding skills (Keane 1987).

The terns nest in coastal areas adjacent to shallow marine and estuarine habitats, where they can forage on fish at the water surface by diving into the water. Most foraging (80 percent) occurs within 3 miles of the nesting site (see Figure 4.3-1). Primary prey items of the California least tern are the northern anchovy, topsmelt, and jacksmelt (Massey and Atwood 1984).

California Brown Pelican

The California brown pelican was originally listed because of its low reproductive success, attributed to the production of thin-shelled eggs as a consequence of pesticide contamination (e.g., DDT). The discharge of DDT was prohibited in 1970, and it appears that the brown pelican population has largely recovered (Anderson et al. 1975; Gress and Anderson 1983; Schreiber 1980). California brown pelicans forage along the coast of California all year, but in smaller numbers during the breeding season (approximately January through June). Breeding occurs in Mexico, in the Gulf of California, and on several of the Channel Islands (Gress and Anderson 1983; URS 1986). Pelicans are diving birds that feed exclusively on fish, primarily anchovies but any small schooling fish near the surface of the water.

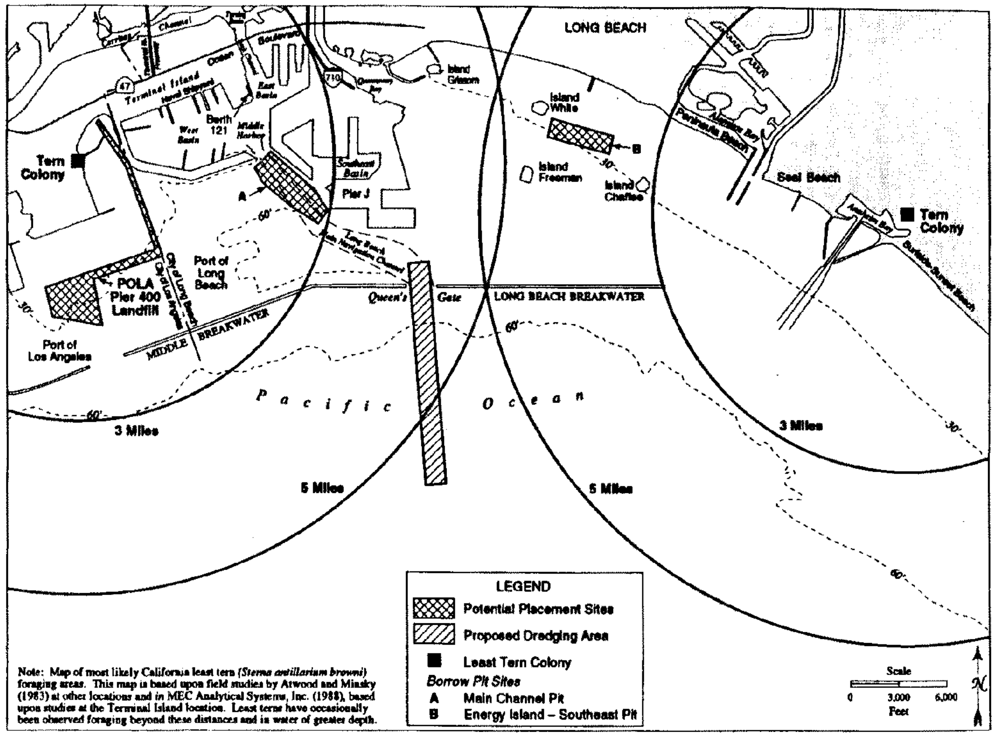


Figure 4.3-1. Location of 3-mile and 5-mile Radii from Least Tern Colonies in Project Vicinity

Brown pelicans have been observed year-round in the harbor complex, although their numbers fluctuate seasonally due to an influx of postbreeding birds from Mexico in the summer. Studies conducted in 1983 and 1984 (MBC 1984) indicated that the highest densities of brown pelicans occur between early July and early November (several thousand birds), with a sharp decrease in numbers after November. Minimum densities were noted in late March. Brown pelicans were one of the most abundant species observed in the Los Angeles Outer Harbor during studies conducted in 1986 and 1987 (MEC 1988). Within the Outer Harbor, pelicans rest on breakwaters in areas with little human disturbance (MEC 1988). In particular, remote areas of the Middle Breakwater appear to be preferred resting spots (MBC 1984; MEC 1988).

Port of Long Beach

Long Beach Outer Harbor consists of open water habitat with depths up to about 90 feet, soft bottom habitats from intertidal to 90 feet, and hard substrates such as riprap and pilings from intertidal to about 50 feet. The area to be dredged outside Queen's Gate is open water over soft substrate with depths of about 60 feet and deeper.

Soft bottom habitat supports both infaunal organisms that burrow in the substrate and epifaunal animals that live on the surface of the substrate. Epifaunal macroinvertebrates feed directly or indirectly on the infauna, and many, in turn, are eaten by fish. The infauna of the dredging area is dominated by annelid worms (MBC 1984). The most common species are the polychaete worms *Lumbrineris tetraura*, *Mediomastus ambiseta*, *Spiophanes missionensis*, and *Apoprionospio pygmaea*. These are all common species found in coastal waters of the region. Samples collected in 1983-84 indicated a density of 2,733 organisms per square meter ($/m^2$) and a biomass of 19.5 grams/m^2 (wet weight basis). A mean of 50 species was collected. Infaunal productivity was calculated to be 10.9 g/m^2 per year (dry weight basis).

Otter trawl data for the area just outside Queen's Gate (MBC 1984) indicated that white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*), shiner surfperch (*Cymatogaster aggregata*), and basketweave cusk-eel (*Ophidion scrippsae*) were the most abundant species collected in day and night samples. These are species typical of coastal waters over soft bottom habitat.

In addition to fish, the water column supports planktonic organisms (i.e., those that are passively carried by water currents). Phytoplankton photosynthesize, as do terrestrial plants, and the dominant organisms are diatoms, dinoflagellates, and blue-green algae. Their abundance varies seasonally in response to light and nutrient concentrations. Zooplankton include small animals such as copepods and cladocera as well as the eggs and larvae of fish and benthic invertebrates. Availability of food (primarily phytoplankton) and breeding seasons influence the abundance of the organisms.

Numerous marine-associated birds use the Los Angeles-Long Beach Harbor area (MBC 1984; MEC 1988). In the breakwater area, 15,901 individuals in 45 species were recorded in a year-long study (MBC 1984). The Middle Breakwater was the highest use area of the 10 survey locations in Long Beach Harbor. The dominant species were Heermann's gull (*Larus heermanni*), brown pelican, western gull (*Larus occidentalis*), and Brandt's cormorant (*Phalacrocorax penicillatus*), comprising over 80 percent of the individuals observed. These common sea birds use the breakwaters for resting and use open waters for foraging and resting. No nesting occurs in this area.

Marine mammals such as dolphins and sea lions that are common in nearshore waters would be expected to pass through the area to be dredged with some regularity. Harbor seals would be present infrequently. Some gray whales could cross the area during their winter and spring migrations along the coast, but most would pass farther offshore, particularly on their southward migration. Other whale species are not expected to pass through the area to be dredged, except possibly the humpback whale as rare transient visitors.

Landfill in the Port of Los Angeles

The Pier 400 area has been described in the EIS/EIR for the DDNI (COE and LAHD 1992). The landfill is in an area of soft bottom habitat with average benthic infaunal densities of 75 g/m^2. Nearby are hard substrates such as rocky dikes, pier pilings, and bulkheads that support barnacles, mussels, and anemones. The most abundant fish species are northern anchovy, white croaker, sardine, and queenfish.

Borrow Pits

The borrow pit placement areas all have soft bottom habitat under open water (55 to 90 feet deep). Hard substrates are located near the Long Beach Main Channel borrow pit (i.e., dikes and berthing facilities) and the Energy Island borrow pits (i.e., at the islands). Data from earlier surveys in the Long Beach Harbor area (inside and outside the harbor) indicate that the dominant benthic infaunal species found in 1983-84 (MBC 1984) and 1990-91 (MBC unpublished data) have been common in the area for at least 10 to 15 years. The abundance of individual species has varied seasonally and spatially. Seasonal changes are generally related to life history strategies and seasonal variations such as temperature, while spatial variations are related to sediment characteristics and other physical/chemical variables (MEC 1988; MBC 1984).

Benthic infaunal surveys in 1983 (MBC 1984) showed the dominant species in Long Beach Main Channel to be *Cossura candida*, *Tharyx* sp., *Prionospio cerrifera*, *Leitoscaloplos elongatus*, and *Carinomella lactea*. Mean abundance was 2,338 organisms/m^2 and mean biomass was 21.7 g/m^2. The channel was dredged in 1990. Surveys in 1994 (MEC unpublished data) indicate that the dominant species are *Cossura* sp., *Mediomastus* spp., *Scleroplax granulata*, *Listriella goleta*, *Prionospio lighti*, and *Neotrypaea californiensis*.

No site-specific benthic infaunal data are available for the Energy Island borrow pits. Invertebrate populations in these borrow pits are expected to be similar to those in areas with comparable sediment grain size and depth. Data for the vicinity of the Energy Island borrow pits indicate a wide range in sediment characteristics ranging from 98 percent sand to 11 percent sand (MBC unpublished data). Samples in the pits (Sea Surveyor 1994) showed only 1 to 3 percent sand.

Colonization of the pits after they were dredged would have occurred as organisms along the edges migrated inward and as larvae settled from the water column. The species of larvae available for recruitment would be predominantly the common species present in the general area. Different sediment characteristics in the pits could influence the species colonizing the pits, shifting the community towards more pollution/disturbance tolerant species such as *Capitella capitata*. Colonization normally follows a pattern of succession (i.e., a change in species composition) until a dynamic community is established, usually in about 2 to 3 years. The total biomass of infaunal organisms present increases (usually rapidly) as the area is colonized. As species composition changes, the total biomass may increase, decrease, or stay the same.

Polychaete worms are the dominant species found at most locations sampled to the west and south of the pits. The most abundant species in most samples was *Cossura candida*. *Mediomastus* sp. were also common (MBC unpublished data). Data from two stations at depths of 52 to 55 feet showed an average density of 11,263/m^2 and a biomass of 40.4 g/m^2 (MBC unpublished data). The abundance and biomass of benthic infaunal organisms in the borrow pits are assumed to be similar. Abundance and biomass in polluted sediments can be higher than in clean sediments, if pollutants are not very toxic, but this phenomenon is usually due to a few pollution tolerant species.

Trawling data from 1983-84 (MBC 1984) indicate that queenfish, white croaker, California tonguefish (*Symphurus atricauda*), and northern anchovy (*Engraulis mordax*) are among the dominant species found in the vicinity of the Long Beach Main Channel borrow pit. Trawling and lampara net surveys within the borrow pit in 1994 (MEC unpublished data) showed the same species to be abundant, but the plainfin midshipman (*Porichthys myriaster*) and sardine (*Sardinops sagax*) were also common. Trawl surveys near Island White found white croaker, walleye surfperch (*Hyperprosopon argenteum*), and white surfperch (*Phanerodon furcatus*) to be common (Chamberlain 1974). All of the above species are common in southern California coastal waters.

Marine mammals (except whales) that may be present in the vicinity of the Energy Island borrow pits would be similar to those described for the area to be dredged outside Queen's Gate. Whales, however, would not be likely to pass through areas as close to shore as the borrow pits. No marine mammals would be expected to be present at the borrow pit in the Long Beach Main Channel.

LA-2

The LA-2 site is located in deep waters on the San Pedro Escarpment along the east side of the San Pedro Basin. Water depths range from 390 to 1,050 feet. The depth of the basin is approximately 3,282 feet, and the substrate is sandy silt. An EIS prepared for the LA-2 site provides extensive data for the area (EPA 1988). The following is a brief summary from that report.

The benthic habitats present at or adjacent to the LA-2 site are mainland shelf, continental slope, and basin. Mainland shelf habitats generally have a higher species abundance and standing crop (biomass) than the other two habitats. At depths of 56 to 786 feet, the San Pedro Shelf habitat was found to be dominated by polychaetes and mollusks with echinoderms, crustaceans, and nemerteans also present; in deeper waters polychaetes were dominant with lesser numbers of mollusks, crustaceans, and echinoderms (EPA 1988). The LA-2 site is located partly on the shelf and partly on the continental slope. The dominant infaunal groups were polychaetes, crustaceans, mollusks, and echinoderms. Density of organisms ranged from 2,000 to 11,000 organisms/m^2, and 42 to 105 species were found per 0.1 square meter sample. The species composition was indicative of moderate pollution stress (EPA 1988).

Epifauna of the shelf and slope generally increase in abundance with depth. Trawl sampling in 1983-84 at depths of 426 to 1,026 feet at the LA-2 site found the urchin *Allocentrotus fragilis* and the shrimp *Sicyonia ingentis* to be dominant. A total of 70 species were collected. More intensive trawling in the general area by the Southern California Coastal Water Research Project (SCCWRP) found 500 species (Moore et al. 1983).

Flatfish and rockfish dominated the demersal (bottom) fish population at the LA-2 site. Slender sole (*Lyopsetta exilis*), Pacific sanddab (*Citharichthys sordidus*), and shortspine combfish (*Zaniolepis frenata*) were the most abundantly caught species (EPA 1988). Pelagic fish were not sampled at the LA-2 site, but common species in the region include northern anchovy, Pacific saury (*Cololabis saira*), jack mackerel (*Trachurus symmetricus*), yellowtail (*Seriola dorsalis*), and California barracuda (*Sphyraena argentea*). These and other common pelagic fish are of sport and commercial importance that feed on zooplankton and other pelagic fish (EPA 1988). Deep-sea pelagic fish often perform periodic vertical migrations so that they may be found at several depths. The most commonly collected species in the area are California smoothtongue (*Leuroglossus stilbius*), northern lampfish (*Stenobrachius leucopsarus*), and *Triphoturus mexicanus* (EPA 1988).

Several species of marine mammals pass through the LA-2 area, primarily whales and dolphins. Seals and sea lions are generally found in shallower waters along the coast or at the offshore islands, but the California sea lion (*Zalophus californianus*) and harbor seal (*Phoca vitulina*) could be present at times. A variety of sea birds occur in coastal and offshore areas. They forage over the water and may use the water surface for resting. Common species include loons, grebes, shearwaters, gulls, terns, double-crested cormorant, surf scoter, brown pelican, and black storm-petrel (EPA 1988).

Commercial Fishing

Commercial fishing within the Los Angeles-Long Beach Harbor is limited to a live bait fishery, while a variety of commercial fisheries occur outside the harbor (COE and LAHD 1990). Trap fisheries extend from just outside the harbor breakwaters to several miles offshore, while set and drift nets are restricted to beyond 3 miles from shore. Trawling occurs in deeper waters offshore. The live bait fishery targets northern anchovy and squid (*Loligo opalescens*). Anchovies are harvested in the harbor from May through October in most years and outside the harbor, whenever the fish can be found, the remainder of the year. The live bait fishery within the harbor consists of one local fisherman. Data from 1984-86 indicate that up to seven nets may be present on any given day. The primary target species is California halibut, although other species are fished at some times of the year. Halibut fishing occurs from mid-June to mid-March. Adults spawn in shallow waters near embayments, including San Pedro Bay, in late winter to early spring, and juveniles use protected embayments and estuaries for nurseries, emigrating after maturity (about 2 years) (MBC 1987). Rockfish are generally fished at depths of 420 feet or greater (beyond 3 miles from shore). As of January 1, 1994, pursuant with Proposition 132 (Marine Resources Protection Act of 1990), fishing by gill nets is no longer permitted "within three nautical miles offshore of the mainland coast, and the area within three nautical miles off any manmade breakwater, between a line extending due west from Point Arguello and a line extending due west from the Mexican border". Crab and lobster are fished using traps. Crab season is open all year while lobster season extends from early October to mid-March. Traps are set near the harbor breakwaters as well as at other locations along the coast.

4.3.2 Impact Significance Criteria

Criteria for determining the significance of project-related impacts on biological resources are based on the importance of the resource, the proportion of the resource that would be affected relative to its occurrence in the project region, the sensitivity of the resource to activities associated with the project, and the duration or the ecological ramifications associated with the effect.

Impacts are considered significant if they would result in (1) degradation of the habitat for, or reduction in, the population size of state or federally listed (threatened or endangered), proposed, or candidate species; (2) degradation of biologically important habitats (e.g., spawning or nesting areas, foraging/feeding areas, and areas of high biological activity); (3) a measurable change in species composition or abundance beyond that of normal variability (particularly for common or abundant species); or (4) a measurable change in ecological function within a localized area. Short-term impacts are those lasting less than 5 to 10 years, and long-term impacts are those lasting beyond 10 years.

Impacts to commercial fishing are considered significant if one or more of the following criteria are met:

- A 10 percent or greater loss of, or preclusion from, currently productive fishing grounds in the project area for more than 10 percent of the open or peak season.

- If 10 percent or more of the fishermen regularly using fishing grounds in the project area are precluded from fishing for 10 percent or more of the open or peak season.

4.3.3.1 The Dredge Area

Deepening the approach channel to Queen's Gate to a depth of 76 feet below MLLW would disturb 385.7 acres of deep soft bottom habitat. The entire area would not be disturbed at the same time, but rather progressively over about 16 to 22 months. At a density of $2,733/m^2$, a total of 4.3 billion benthic invertebrates would be removed during dredging. The biomass of the organisms removed would be 30.4 metric tons. At least some of the organisms would immediately become part of the food web during dredging and particularly during discharge of the spoils from the barges at the disposal sites (see section 4.2.2.3). Others would be buried in the spoil and enter the food web more slowly. The loss of invertebrates would be short term with recolonization to a dynamic community complete in 2 to 3 years (MEC 1988). The species composition following recolonization would differ somewhat from that currently present due to potential changes in sediment characteristics (e.g., grain size) and depth. The greatest change in depth would be closest to Queen's Gate. The potential differences in benthic infaunal community structure are expected to be minor and would not be significant.

As described under oceanography and water quality (section 4.2), turbidity from the dredging operation would likely range between 1,000 to 4,000 feet and could even extend 4,000 feet from the dredge site depending on localized conditions. Much of this turbidity would result from overfilling or draining turbid water from the hopper. Deposition from the suspended sediment plume would occur over that area, but most of the deposition would occur within about 50 to 100 feet of the dredge with negligible amounts beyond 500 feet (unpublished data from POLA). Thus, some benthic organisms within about 100 feet of the dredge would be impacted by the sedimentation. The area affected would be approximately 64 acres. Impacts of dredging and sedimentation on benthic communities would be short term and not significant.

Sediment testing results indicate that the concentrations of metals and organic chemicals in the dredge sediments are lower than at the placement sites. The potential for release of metals and organic chemicals from the sediments resuspended during dredging would be negligible (refer to section 4.2). Consequently, direct toxic effects to marine organisms or bioaccumulation through the food web would be negligible.

Turbidity could have short-term effects on plankton in the immediate vicinity of the dredging operation. No significant impacts would occur due to the relatively small area affected by the turbidity plume and the rapid recovery of these populations.

Fish populations in the area to be dredged would be affected in several ways. Most species would avoid the dredging area due to noise and turbidity, resulting in a temporary loss of habitat. Noise would have negligible effects on avoidance because short, high-intensity noises that can cause startle responses in fish are not expected to result from the proposed project. Turbidity would limit visibility for sight-feeding fish, and these would likely avoid the turbidity plume. Other species would be attracted to the site to forage on benthic organisms suspended by the dredging. Impacts would be restricted to a small area around the dredge and would not be significant. Recovery would occur within a few days after dredging stops and turbidity dissipates.

Dredging activities during the daytime would cause most seabirds to avoid the immediate disturbance area while scavenger species such as gulls might be attracted to the site. Activities close to the Queen's Gate could disturb birds resting or roosting on the breakwaters. Some individuals might move farther down the breakwater away from the disturbance while others might leave the area until the dredging is complete. Effects would diminish as the dredging operation moves offshore. Of particular concern would be the potential for effects on the California brown pelican that rests on the breakwaters and forages throughout the general area. Dredging activities and the turbidity plume would likely preclude pelican foraging in a small area. The fish that brown pelicans forage on, however, are expected to move away from the dredge site and thus would be available for capture elsewhere. The number of individuals potentially affected would be lowest from December through June when few are present. Nesting activities would not be affected, and only a very small fraction of the available foraging area would be temporarily affected. Dredging adjacent to the breakwater would cause some brown pelicans to temporarily avoid resting or roosting near Queen's Gate. These individuals could use other portions of the breakwater away from this activity. The remainder of the area to be dredged is farther away, and dredging there would have negligible impacts on resting or roosting. Impacts are expected to be short term and not significant, because the dredge would be located outside the breakwater most of the time and be similar to other commercial vessels that currently pass through the area. Overall, dredging activities would not affect the brown pelican or other seabird populations. These impacts would not jeopardize the continued existence of the California brown pelican.

The California least tern is present in the harbor area from April through August. Those individuals occasionally foraging in the area to be dredged may be impacted, especially early in the spring before the young hatch (the closest nesting site is approximately 4.4 miles from Queen's Gate), see Figure 4.3-1. As discussed for the brown pelican, fish that the terns feed on are expected to move away from the turbidity plume. Any individuals attempting to forage in the vicinity of the dredge could forage in adjacent undisturbed areas with no effects on their ability to find food. After the young hatch, the adults tend to forage over shallow waters near the nesting site on Pier 300. Dredging activities near Queen's Gate will not affect the least tern population, and would not jeopardize the continued existence of the species.

Marine mammals that might be present in the project area would also likely avoid the disturbed area, and no important feeding or resting areas would be affected. Consequently, impacts are predicted to be insignificant. Sea turtles passing through the area could also avoid the disturbance, and the few individuals that could be present would not be adversely affected. The project would not jeopardize the continued existence of any of these species.

During night operation of the dredge, high intensity flood lighting would be used. The light would be directed onto the dredge deck and would also illuminate the immediate vicinity of the dredge. The light would have no effect on benthic invertebrates and negligible effects on plankton, fish, and marine mammal populations due to the small area affected. Birds that roost on the breakwaters at night may avoid the area influenced by the light while the dredge is immediately adjacent to Queen's Gate. The amount of roosting habitat affected would be small and would decrease as the dredge moves off shore. A temporary small reduction in the amount of roosting habitat available on the breakwaters would not affect the populations of any species, including the brown pelican. The light would have no effect on the least tern due to the distance from the nesting site and because this species is not active at night.

Commercial trap fishing along the breakwaters could be adversely affected in the vicinity of Queen's Gate during the short time that dredging is occurring in that area. The area affected would be small and impacts would be adverse but not significant. Lobster, crab, and fish that move away from the dredging would be available for catch elsewhere.

4.3.3.2 Placement Options

Landfill in the Port of Los Angeles

Transport of dredged material into the POLA for placement in the Pier 400 landfill would have negligible impacts on marine biological resources. The hopper dredge trips from the dredge site to the placement site would be similar to the existing commercial vessel traffic in the harbor. Specific mitigation measures for impacts from material placement at this site on the least tern, developed in the DDNI EIS/EIR (COE and LAHD 1992), would be the POLA's responsibility.

Borrow Pits

Main Channel Borrow Pit

Placement of the dredged material in this borrow pit would bury the benthic invertebrates present. Losses are estimated to be 125 million organisms with a biomass of 11.4 metric tons. Settlement of sediments within about 100 feet of the pit would bury some additional benthic organisms. Raising the elevation of the pit from 90 feet to 80 feet below MLLW would have negligible effects on the habitat. Recolonization by the same species that are currently present in the pit would be expected within 2 to 3 years. Impacts on benthic infaunal communities would be short term and not significant.

Benthic organisms settling to the bottom after the sediments have been released from the hopper dredge would be immediately available prey for fish and scavengers such as starfish and crabs in the area. Most organisms in the dredged material would be buried in the fill and not readily available to the food web.

Turbidity resulting from placement would have negligible impacts on plankton as described for the dredge site. Most fish would temporarily avoid the discharge area due to turbidity and falling sediments while some would be attracted to feed on the invertebrates released from the sediments. Fish could return to the area between loads of fill. No important spawning grounds or foraging areas would be affected. Overall impacts on fish populations would be short term and not significant. Recovery to preproject conditions should occur as soon as turbidity disperses.

Night lighting on the dredge would have negligible impacts on fish, plankton, and seabirds as described for the dredge site.

Placement of sediments into the pit, including transport by the dredge, would have no adverse effects on seabirds since few are expected in the pit area due to frequent vessel traffic. The borrow pit is located within 3 miles of the Terminal Island least tern nesting colony, but the depth of water at the placement site makes it unlikely that the terns forage in that area. Furthermore, fish that avoid the disturbance would be available for capture elsewhere. Thus, no effect on the least tern population is predicted, and use of the placement area would not jeopardize the continued existence of the species. No effect on the California brown pelican population is expected for the reasons discussed for dredging area impacts. Use of the placement site would not jeopardize the continued existence of the species.

Impacts on marine mammals and sea turtles are predicted to be negligible since few if any individuals would be affected.

Commercial fishing is not allowed landward of the Port of Long Beach/Los Angeles breakwaters, pursuant with Proposition 132; therefore, no impacts are expected.

Energy Island Borrow Pits

The sediments discharged into the pits would bury the benthic invertebrates present. For the southeast borrow pit, losses would be 4.2 billion organisms with a biomass of 15 metric tons. For the north borrow pit, losses would be 11.4 billion organisms with a biomass of 41 metric tons. In addition, settlement of suspended silt for about 100 feet beyond the edges of the pit would bury some benthic organisms. Filling the pits (i.e., raising the bottom elevation from about 60 feet to 30 feet below MLLW) with sediments having a higher sand content than currently in the pits would provide shallower habitat similar to adjacent areas that would be recolonized by benthic species within about 2 to 3 years. Species expected to be common include *Cossura candida*, *Mediomastus* spp., and *Euphilomedes carcharodonta*. Impacts on benthic infaunal communities in the borrow pits would be short term and not significant. Increasing the grain size and decreasing the depth with sediments that are generally cleaner (i.e., having lower concentrations of metals and organic chemicals as described in section 4.1) would provide conditions suitable for colonization for the common species found in adjacent areas. This would likely be an improvement in the local ecology by restoring the topography to shallower habitat that is generally more productive than deeper habitats.

Some of the benthic organisms in the dredged material would provide food for fish and benthic organisms that live on the bottom sediments (e.g., starfish and crabs). Most of the organisms in the discharge, however, would be buried in the fill and lost to the ecosystem.

Turbidity would have negligible impacts on plankton as described for the dredge site.

As described for the dredge area, most fish would temporarily avoid the discharge area due to turbidity and falling sediments while some would be attracted to feed on the organisms in the discharge. Since the frequency of discharge would be approximately once every 3 hours, fish may return to the area between discharge events. No important spawning grounds or foraging areas would be affected. Night lighting on the dredge would intermittently affect a small area and would have negligible effects on fish. Fish populations in the disposal pit area after the project is complete are expected to be about the same as those currently found in adjacent areas where water depths are approximately 30 feet. The species composition and abundance of fish living on or near the new, shallower bottom may differ somewhat from that currently in the bottom of the pits due to shallower water and any changes in abundance and species composition of benthic organisms used for food. The species of fish expected are all common in the area. Impacts on fish populations would be short term and not significant. The resulting shallower water would increase the amount of suitable habitat for California halibut spawning, a potential benefit to commercial and sport fishing.

Seabirds using the discharge area would be temporarily disturbed every time a barge arrived and released sediments. This would occur approximately seven to eight times over a 24-hour period. As described in section 4.2, the turbidity plume would be greatest closer to the bottom, and the weak currents in the area are unlikely to disperse it over a very large area. Thus, a relatively small amount of potential foraging area would be affected. Night lighting on the dredge would intermittently affect a small area of the discharge site. These disturbances would not affect any sensitive species, such as the brown pelican or least tern, since few if any individuals would be expected in the area. Least terns are only present in the harbor area from about mid April through August and most foraging is within 3 miles of the nest site. The borrow pits are over 4 miles from both tern colonies (see Figure 4.3-1) and, since the plume would sink over time, any turbidity impacts to the upper waters where the terns forage would be very short-term. The pelicans forage widely throughout the area, and their abundance is low during winter and spring. Neither species forages at night. Any impacts would not affect the local populations of either species. Birds could use the water surface in the intervals between discharges. Impacts would be short term, over a small area, and not significant for any species.

Placement of sediments into the pits would have negligible impacts on marine mammals and sea turtles. Few, if any, individuals are expected to be present at this location, and those passing through the area, such as sea lions or dolphins, could easily avoid the disturbance.

Hopper dredge traffic between the dredge site and the placement site would have negligible effects on marine organisms in the water column and seabirds that use the water surface due to the small number of trips in an area that already has substantial vessel traffic.

As discussed above, no commercial fishery impacts will be expected (Proposition 132). However, project benefits may occur by raising the pit elevation, which will increase the total area available for halibut to use as spawning and juvenile rearing grounds.

LA-2

Discharge of dredged sediments at the LA-2 site would bury some benthic organisms. The site is about 2.4 square miles and water depths range from 390 to 1,050 feet. Thus, discharges from barges would tend to spread out in a thin layer over the bottom due to horizontal currents in the water column. The amount of benthos affected would depend on whether the individual discharges occurred at the same location or were spread out over the entire site. Benthic organism densities are generally higher than those found in the area to be dredged. Impacts would be short term and insignificant since effects would be either diffuse over the site or concentrated in a small area.

Turbidity would have negligible impacts on plankton as described for the dredge area.

Disturbance of fish populations in the water column and on the bottom in the immediate disposal area would occur about every 4.5 hours over approximately 22 months. The amount of area affected with each dredge load of sediment and from night lighting on the dredge would be small. Impacts would be short term and not significant as a result.

Seabirds in the LA-2 area and along the route from Queen's Gate to LA-2 would be temporarily disturbed as each dredge arrives. This traffic would be no different than other vessel traffic in the area and would have negligible effects on birds. Similarly, dredge traffic to and from the site and discharge of sediments would have no adverse effects on marine mammals and sea turtles. These species are very mobile and move through the area. The probability of individuals being present within the dredge route or at the LA-2 site when the project barges are there is very low. Furthermore, the animals can easily avoid the barges. Night lighting on the dredge would affect a very small area immediately around the vessel with no impacts on birds. No brown pelicans or least terns would be affected by the transport and discharge of sediments at the LA-2 site.

Interference with commercial fishing at this site is expected to be negligible considering the frequency of discharge and the small area affected at any one time.

4.3.3.3 Ancillary Facilities

Crude Oil Storage Tanks

Construction and operation of the storage tanks at the ARCO site would have no impacts on marine biological resources and commercial fishing since no activities would occur in or near harbor waters. Any potential impacts on least terns or other sensitive species would be addressed by the site-specific environmental document that will be prepared prior to construction of these tanks.

Staging Area

Runoff of pollutants from the staging area on the Naval Mole into harbor waters would have negligible impacts on marine biological resources and commercial fishing. The site is located approximately 1.5 miles from the Terminal Island least tern nesting colony. Project activities at the staging area would be confined to previously developed areas and no foraging habitat would be affected. No roosting or resting habitat for the brown pelican would be affected. Consequently, use of the staging area would have no effect on either species' population and would not jeopardize the continued existence of these species.

4.3.4 Long-Term Impacts

Filling the Energy Island borrow pit to a depth of 30 feet below MLLW would have long-term beneficial impacts on benthic infauna and potentially for fish that rest on the bottom and/or forage on infaunal organisms. Cleaner (less polluted) sediments and shallower water are expected to result in a greater diversity of benthic infaunal organisms in the area filled once recolonization has occurred (approximately 2 to 3 years). These organisms would provide a wider range of prey items for fish and would decrease the potential for bioaccumulation of pollutants in predators.

4.4 AIR QUALITY

The air quality analysis in this section describes the existing conditions in the project area. Short-term (i.e., construction) and long-term emissions associated with the project are estimated to determine the significance of potential project-specific impacts with respect to federal, state, and local regulations and standards. Dredging and placement activities as well as project-related employee commuting are considered sources of construction impacts, while vessel activities associated with Berth T121 are considered sources of long-term impacts. Under the long-term impacts, emissions from vessel operations allowed by the completion of the proposed dredging are compared to emissions that would occur if the project did not proceed (the no-action alternative) in order to estimate the overall air quality effect of implementing the project.

4.4.1 Affected Environment

The project dredging and potential placement sites are located in and near the POLB, which is located in San Pedro Bay in the southwestern coastal area of the South Coast Air Basin (SCAB). The SCAB consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange County. The SCAB covers an area of approximately 6,600 square miles and is bounded on the west by the Pacific Ocean; on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains; and on the south by the San Diego County line.

The potential for adverse air pollution conditions in the SCAB is high, particularly during the period from June through September. Poor ventilation caused by generally light winds and shallow vertical mixing is frequently insufficient to disperse the large quantities of emissions generated in the basin. In addition, the characteristic plentiful sunshine of the area provides the requisite energy to convert oxides of nitrogen (NO_x) and reactive organic compounds (ROC), which consist of hydrocarbons and related compounds, into ozone. The region of influence for ozone impacts due to project-related emissions of ROC and NO_x includes the entire SCAB. The general climatic and meteorological conditions, baseline air quality, and information describing current emissions in the SCAB are described in the sections below.

<u>Climate and Meteorology</u>

The climate of the SCAB is classified as Mediterranean, characterized by cool, dry summers and mild, wet winters. The major influence on the regional climate is the Eastern Pacific High, a strong persistent anticyclone (i.e., counterclockwise circulation), and the moderating effects of the cool Pacific Ocean.

Large-scale circulation associated with the Eastern Pacific High produces an elevated temperature inversion along the West Coast. The base of this subsidence inversion is generally from 1,000 to 3,000 feet above mean sea level during the summer. Vertical mixing is often limited to the base of the inversion, and air pollutants are trapped in the lower atmosphere. The mountain ranges that rim the Los Angeles Basin constrain the horizontal movement of air and also inhibit the dispersion of air pollutants out of the region. These two factors are largely responsible for producing the high pollutant conditions experienced in the SCAB. During the summer, these two factors together with the long hours of sunlight result in the formation of high concentrations of ozone. During the winter, the same two factors produce stagnant air that allows pockets of high concentrations of carbon monoxide to form.

The average annual precipitation for the Long Beach Airport, located a few miles north of the San Pedro Bay region, is 11.54 inches. Rainfall at Long Beach Airport follows the Mediterranean rainfall pattern.

Most of the rainfall occurs between November and March, with no measurable rainfall during the summer.

The average high and low temperatures measured at the nearest National Weather Service monitoring location (Long Beach Airport) in July are 83.0 degrees Fahrenheit and 62.6 degrees Fahrenheit, respectively. January average high and low temperatures are 66.0 and 44.3 degrees Fahrenheit. Temperatures in the San Pedro Bay region are generally less extreme, due to the moderating effect of the ocean. The proximity of the Eastern Pacific High and a thermal low pressure system in the interior desert region to the east produces a general westerly, onshore air flow in the region for most of the year. The high frequency of southwest to northwest sea breezes usually occurs during the daytime for most of the year and transports air pollutants away from the coast toward the interior regions in the afternoon hours. Easterly winds are attributed to nighttime and wintertime land breezes.

High pollutant impacts can occur during these conditions when land breezes transport onshore emissions over the ocean, then return them with the onset of the sea breeze to recombine with local emissions. This "sloshing" effect is known to produce high ozone concentrations in the SCAB during the warmer months of the year.

During the fall and winter months, the Eastern Pacific High can combine with high pressure over the continent to produce light winds and extended inversion conditions in the region. These stagnant atmospheric conditions often result in adverse pollutant concentrations in the SCAB. Excessive build-up of high pressure in the Great Basin region can produce a "Santa Ana" condition, characterized by warm, dry, northeast winds in the SCAB and offshore regions. Santa Ana winds often ventilate the basin and prevent the build-up of air pollutants.

Baseline Air Quality

Air quality at a given location is described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate federal and/or state ambient air quality standard. The standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population. Federal standards, established by the U.S. Environmental Protection Agency (EPA), are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS are defined as the maximum acceptable concentrations that may not be exceeded more than once per year, except annual standards, which may never be exceeded. The State standards, established by the California Air Resources Board (ARB), are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are defined as the maximum acceptable pollutant concentrations that are never to be equaled or exceeded. The NAAQS and CAAQS are presented in Table B-1 (see Appendix B). The pollutants of most concern that are considered in this analysis include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter smaller than 10 microns in diameter (PM_{10}). Ozone is formed from the ROC portion of volatile organic compounds (VOC) and oxides of nitrogen (NO_x).

The EPA designates all areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. A nonattainment designation means that a primary NAAQS has been exceeded more than three discontinuous times in three years in a given area. Pollutants in an area are often designated as "unclassified" when there is a lack of data for the EPA to form a basis of attainment status. At the present time, the SCAB is in "extreme" nonattainment for the NAAQS for O_3, "serious" nonattainment for the NAAQS for CO and PM_{10}, nonattainment for the NAAQS for NO_2, and in attainment of the NAAQS for SO_2. The ARB also designates areas of the state as either in attainment or nonattainment of the CAAQS. An area is in nonattainment if the CAAQS has been exceeded more than once in three years. At the present time, the SCAB is in "severe" nonattainment for the CAAQS for O_3, NO_2, and CO, nonattainment for the CAAQS for PM_{10}, and in attainment of the CAAQS for SO_2 (SCAQMD 1994). (For an explanation of the classification schemes for the NAAQS and CAAQS, i.e., "extreme," "severe," "serious," etc., see Appendix B.)

Maximum pollutant concentrations measured at various monitoring stations maintained by the South Coast Air Quality Management District (SCAQMD) within the SCAB from 1991 through 1993 are provided in Table 4.4-1 and characterize the background air quality of the San Pedro Bay area (ARB 1992 and 1993; SCAQMD 1994).

The North Long Beach location is the closest air quality monitoring station to the San Pedro Bay area, located approximately 8 miles to the north. Generally, concentrations of photochemical smog, or O_3, are highest during the summer months and coincide with periods of maximum solar insolation. Inert pollutant concentrations (those pollutants other than O_3) tend to be the greatest during the winter months when extended periods of light wind conditions and surface-based temperature inversions occur. A summary of the maximum pollutant levels monitored in the San Pedro Bay area is shown in Table 4.4-1.

South Coast Air Basin Emissions

The total air emissions that occurred in the SCAB during 1990 are displayed in Table 4.4-2. The SCAB emissions inventory is periodically updated for planning purposes to forecast future emissions inventories, to analyze individual control measures, and for input data to regional air quality modeling. The inventory emissions are reported to the ARB who compiles the information from all air districts pursuant to Section 39607(b) of the California Health and Safety Code. The 1990 inventory represents the most current emissions data available for the SCAB (SCAQMD 1994). Table 4.4-2 shows that the largest contributors to air pollutants in the SCAB are mobile sources, but that ships are a very small fraction of mobile source emissions. On-road motor vehicles account for 52.4 percent of the VOC, 57.2 percent of the NO_x, and 79.2 percent of the CO emitted in the SCAB.

The baseline emissions from ships affected by the project were estimated using ship call data supplied by the LAD staff (personal communication B. Williams 1995) and emission factors and fuel use data from the Port Vessel Emissions Model (PVEM) (DOT 1986). A detailed description of the methodology used to estimate ship emissions can be found in Appendix C. Ships affected by the proposed action (those docking at Berth T121) currently (1994) emit 5.19 tons per year of CO, 65.22 tons per year of NO_x, 17.64 tons per year of PM_{10}, 3.79 tons per year of ROC, and 329.90 tons per year of SO_x.

4.4.2 Impact Significance Criteria

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. Impacts are considered significant if total project emissions (1) increase ambient pollutant levels from below to above the NAAQS or CAAQS; (2) substantially contribute to an existing or projected air quality standard violation; (3) are inconsistent with Air Quality Management Plan (AQMP); or (4) exceed the following thresholds that the SCAQMD defines as significant under CEQA as shown in Table 4.4-3.

Table 4.4-1

MAXIMUM POLLUTANT CONCENTRATIONS MONITORED IN THE SAN PEDRO BAY AREA

Pollutant/Monitoring Station	Averaging Time (units)	Maximum Concentration by Year			Number of Days Federal Standard Exceeded**			Number of Days State Standard Exceeded**		
		1991	1992	1993	1991	1992	1993	1991	1992	1993
OZONE										
North Long Beach	1-hour (ppm)	0.11	0.15	0.14	0	6	1	4	19	15
NITROGEN DIOXIDE										
North Long Beach	Annual	0.041	0.039	0.036	0	0	0	NA	NA	NA
North Long Beach	1-hour (ppm)	0.028	0.18	0.20	NA	NA	NA	2	0	0
SULFUR DIOXIDE										
North Long Beach	Annual (ppm)	0.004	0.004	0.004	0	0	0	NA	NA	NA
North Long Beach	24-hour (ppm)	0.018	0.026	0.014	0	0	0	0	0	0
North Long Beach	1-hour (ppm)	0.14	0.11	0.05	NA	NA	NA	0	0	0
CARBON MONOXIDE										
North Long Beach	8-hour (ppm)	9.3	8.1	6.9*	0	0	0	1	0	0
North Long Beach	1-hour (ppm)	14.0	10.0	9.0*	0	0	0	0	0	0
PM_{10}										
North Long Beach	Annual (geometric) ($\mu g/m^3$)	36.4*	36.6*	33.8	NA	NA	NA	1	1	1
North Long Beach	Annual (arithmetic) ($\mu g/m^3$)	39.8*	38.6*	37.4	1	0	0	NA	NA	NA
North Long Beach	24-hour ($\mu g/m^3$)	92	67	86	0.0%	0.0%	0.0%	25.6%	19.3%	19.7%

Notes: NA = Not applicable.
* = Data presented are valid, but incomplete in that an insufficient number of valid data points were collected to meet the EPA and/or the ARB criteria for representativeness.
** = Annual averaging periods are reported as either being exceeded or not being exceeded. PM_{10} 24-hour standard exceedance, measured as percentage of time samples exceeded standard. Percentage is used because PM_{10} sampling is not performed on a daily basis.

Sources: ARB 1992, 1993; SCAQMD 1994.

Table 4.4-2
1990 Emission Inventory for the South Coast Air Basin
(Tons/Day)

	VOC	*NO_x*	*SO_x*	*PM_{10}*	*CO*
Stationary Sources					
Fuel combustion	14	118	15	15	93
Waste burning	1	2	0	1	5
Solvent use	343	0	0	1	0
Petroleum process, storage, and transfer	109	1	2	3	4
Industrial process	42	1	1	27	2
Miscellaneous	76	1	0	703	9
RECLAIM sources	NA	93	20	NA	NA
SUBTOTAL	585	217	38	749	113
Mobile Sources					
On-road vehicles	761	762	31	70	5,342
Off-road mobile	122	278	33	17	1,376
Ships	1	33	19	2	2
SUBTOTAL	885	1,073	83	89	6,720
TOTAL	1,470	1,290	121	838	6,834

Source: SCAQMD 1994. All values reported as rounded in the 1994 Air Quality Management Plan.

Table 4.4-3. SCAQMD Significance Thresholds

Alternative	CO	NO_x	PM_{10}	ROC	SO_x
Operation (lbs/day)	550	55	150	55	150
Construction (Daily) (lbs/day)	550	100	150	75	150
Construction (Quarterly) (Tons/Quarter)	24.75	2.5	6.75	2.5	6.75

Source: SCAQMD 1993

The following sections discuss air quality impacts that would result from the proposed action. (Feasible mitigation measures that would reduce significant impacts are identified in section 4.4.5.)

The proposed dredging and placement activities would occur for up to 22 months. The main combustive emission sources from the proposed action would be the diesel-powered hopper dredge and the support launches.

Information on dredging and placement emission sources was obtained from LAD staff (personal communication, B. Williams 1995). Emission inventories were estimated for each project activity and were based on reasonable worst-case assumptions. Emission factors used to calculate equipment emissions were obtained from SCAQMD CEQA Air Quality Guidelines (SCAQMD 1993), and special studies on vessel emissions conducted for the ARB (1984). Detailed emission and equipment usage data associated with each project activity are contained in Appendix C.

Since the potential placement sites are located in either San Pedro Bay or several miles offshore, project emissions would be spread over much of the POLB, the San Pedro Bay area, and possibly offshore to the LA-2 site. Additionally, since most of the project emission sources would be from mobile equipment, pollutant impacts would not be large enough in a localized area to exceed any ambient air quality standard.

4.4.3 Construction Impacts

For the air quality analysis of construction impacts, dredging and placement of the dredged material are related and cannot be separated. The placement method for the dredged material directly affects the time available for dredging. The daily and total dredging and placement emissions associated with each placement option are presented below.

Regardless of the placement option, project emissions would be spread over a large area. And, since project emission sources would be mobile, pollutant impacts would not be large enough in a localized area to exceed any ambient air quality standard.

4.4.3.1 Placement Options

Landfill in the Port of Los Angeles

Project Impacts. As shown in Tables 4.4-4 and 4.4-5, the total daily and quarterly emissions associated with this placement option would exceed the SCAQMD Significance Thresholds for NO_x and ROC. Emissions of these pollutants would therefore be significant.

Table 4.4-4. Daily Emissions for the POLA Pier 400 Landfill Option (Lbs/Day)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	85.4	399.7	15.7	28.6	26.7
Transport/Placement	129.7	714.6	49.4	71.2	49.5
Support Launches	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
TOTAL	247.5	1,222.9	73.6	112.5	83.8
TOTAL MITIGATED	247.5	1,039.6	73.6	95.8	21.0
Significance Thresholds	550	100	150	75	150
Threshold Exceeded	No	Yes	No	Yes	No

Mitigation Measures. A complete discussion of mitigation measures identified for this option is in section 4.4.5. Implementation of the measures identified in that section would reduce daily NO_x emissions by 183.3 lbs, daily ROC emissions by 16.7 lbs, and daily SO_x emissions by 62.8 lbs, while the total dredging and placement emissions for this option would be reduced by 16.3, 1.5, and 5.6 tons, respectively. With the mitigation measures implemented, the emissions of NO_x and ROC would remain significant.

Table 4.4-5. Total Emissions for the POLA Pier 400 Landfill Option (Tons)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	7.61	35.58	1.39	2.55	2.38
Transport/Placement	11.54	63.60	4.40	6.34	4.40
Support Launches	1.65	9.57	0.74	1.03	0.67
Employee Commuting	1.23	0.09	0.01	0.09	0.01
TOTAL	22.03	108.84	6.55	10.01	7.46
TOTAL MITIGATED	22.03	92.53	6.55	8.53	1.87
Mitigated Quarterly	11.26	47.30	3.35	4.36	0.96
Significance Threshold (quarterly)	24.78	2.5	6.75	2.5	6.75
Threshold Exceeded	No	Yes	No	Yes	No

Main Channel Borrow Pit

Project Impacts. As shown in Tables 4.4-6 and 4.4-7, the total daily and quarterly emissions associated with this placement option would exceed the SCAQMD Significance Thresholds for NO_x and ROC. Emissions of these pollutants would therefore be significant.

Table 4.4-6. Daily Emissions for the Main Channel Borrow Pit Option (Lbs/Day)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	108.3	506.8	19.8	36.3	33.9
Transport/Placement	112.7	620.8	43.0	61.9	43.0
Support Launches	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
TOTAL	253.4	1,236.2	71.3	110.8	84.5
TOTAL MITIGATED	253.4	1,050.9	71.3	94.4	21.2
Significance Thresholds	550	100	150	75	150
Threshold Exceeded	No	Yes	No	Yes	No

Table 4.4-7. Total Emissions for the Main Channel Borrow Pit Option (Tons)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	7.96	37.25	1.46	2.67	2.49
Transport/Placement	8.28	45.63	3.16	4.55	3.16
Support Launches	1.37	7.91	0.61	0.85	0.55
Employee Commuting	1.02	0.07	0.01	0.08	0.01
TOTAL	18.62	90.86	5.24	8.15	6.21
TOTAL MITIGATED	18.62	77.24	5.24	6.94	1.56
Mitigated Quarterly	11.53	47.82	3.24	4.29	0.96
Significance Threshold (quarterly)	24.78	2.5	6.75	2.5	6.75
Threshold Exceeded	No	Yes	No	Yes	No

Mitigation Measures. A complete discussion of mitigation measures identified for this option is in section 4.4.5. Implementation of the measures identified in that section would reduce daily NO_x emissions by 185.3 lbs, daily ROC emissions by 16.5 lbs, and daily SO_x emissions by 63.3 lbs, while the total dredging and placement emissions for this option would be reduced by 13.6, 1.2, and 4.7 tons, respectively. With the mitigation measures implemented, the emissions of NO_x and ROC would remain significant.

Energy Island – North Borrow Pit

Project Impacts. As shown in Tables 4.4-8 and 4.4-9, the total daily and quarterly emissions associated with this placement option would exceed the SCAQMD Significance Thresholds for NO_x and ROC. Emissions of these pollutants would therefore be significant.

Table 4.4-8. Daily Emissions for the Energy Island - North Borrow Pit Option (Lbs/Day)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	91.2	426.8	16.7	30.6	28.5
Transport/Placement	143.8	792.3	54.8	79.0	54.9
Support Launches	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
TOTAL	267.4	1,327.6	80.0	122.2	91.0
TOTAL MITIGATED	267.4	1,128.6	80.0	104.0	22.8
Significance Thresholds	550	100	150	75	150
Threshold Exceeded	No	Yes	No	Yes	No

Table 4.4-9. Total Emissions for the Energy Island - North Borrow Pit Option (Tons)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	21.26	99.44	3.89	7.13	6.64
Transport/Placement	33.50	84.60	12.77	18.40	12.78
Support Launches	4.32	25.07	1.95	2.70	1.75
Employee Commuting	3.22	0.23	0.03	0.25	0.02
TOTAL	62.30	309.34	18.65	28.47	21.20
TOTAL MITIGATED	62.30	262.97	18.65	24.24	5.31
Mitigated Quarterly	12.17	51.35	3.64	4.73	1.04
Significance Thresholds (quarterly)	24.75	2.5	6.75	2.5	6.75
Threshold Exceeded	No	Yes	No	Yes	No

Mitigation Measures. A complete discussion of mitigation measures identified for this option is in section 4.4.5. Implementation of the measures identified in that section would reduce daily NO_x emissions by 199.0 lbs, daily ROC emissions by 18.2 lbs, and daily SO_x emissions by 68.2 lbs, while the total dredging and placement emissions for this option would be reduced by 46.4, 4.2, and 15.9 tons, respectively. With the mitigation measures implemented, the emissions of NO_x and ROC would remain significant.

Energy Island -- Southeast Borrow Pit

Project Impacts. As shown in Tables 4.4-10 and 4.4-11, the total daily and quarterly NO_x and ROC emissions associated with this option would exceed the SCAQMD Significance Thresholds. Therefore, NO_x and ROC emissions would be significant.

Table 4.4-10. Daily Emissions for the Energy Island - Southeast Borrow Pit Option (Lbs/Day)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	90.5	423.1	16.6	30.3	28.3
Transport/Placement	126.0	694.1	48.0	69.2	48.1
Support Launches	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
TOTAL	248.8	1,225.8	73.1	112.2	83.9
TOTAL MITIGATED	248.8	1,042.1	73.1	95.5	21.0
Significance Thresholds	550	100	150	75	150
Threshold Exceeded	No	Yes	No	Yes	No

Table 4.4-11. Total Emissions for the Energy Island - Southeast Borrow Pit Option (Tons)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	5.70	26.66	1.04	0.91	1.78
Transport/Placement	7.94	43.73	3.03	4.36	3.03
Support Launches	1.17	6.78	0.53	0.73	0.47
Employee Commuting	0.87	0.06	0.01	0.07	0.01
TOTAL	15.67	72.23	4.61	7.07	5.29
TOTAL MITIGATED	15.67	65.65	4.61	6.02	1.33
Mitigated Quarterly	11.32	47.41	3.33	4.34	0.96
Significance Threshold (quarterly)	24.78	2.5	6.75	2.5	6.75
Threshold Exceeded	No	Yes	No	Yes	No

Mitigation Measures. A complete discussion of mitigation measures identified for this option is in section 4.4.5. The use of those mitigation measures would reduce NO_x emissions by 183.7 lbs per day, ROC emissions by 16.7 lbs per day, and SO_x emissions by 62.9 lbs per day, while the total dredging and placement emissions for this option would be reduced by 11.6, 1.0, and 4.0 tons, respectively. With the mitigation measures implemented, the emissions of NO_x and ROC would remain significant.

Combination of POLA Pier 400, Main Channel Borrow Pit, and Energy Island Southeast Pit

Because of their limited capacity, use of the POLA Pier 400 landfill, the Main Channel borrow pit, or the Energy Island southeast borrow pit would require that more than one placement site be used. Tables 4.4-12 and 4.4-13 show the daily and total emissions that would result if these three sites were used in combination for the proposed project. Daily emissions for this combination is based on the worst-case, i.e., the highest daily emissions of each pollutant for each emission source from the respective daily emission tables (tables 4.4-4, 4.4-6, and 4.4-10). The total daily and quarterly NO_x and ROC emissions associated with this combination of sites would exceed the SCAQMD Significance Thresholds. Therefore, NO_x and ROC emissions would be significant.

Table 4.4-12. Daily Emissions for POLA Pier 400, Main Channel Borrow Pit, and Energy Island Southeast Borrow Pit Combined (Lbs/Day)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	108.3	506.8	19.8	36.3	33.9
Transport/Placement	129.7	714.6	49.4	71.2	49.5
Support Launches	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
TOTAL	253.4	1,236.2	73.6	112.5	84.5
TOTAL MITIGATED	253.4	1,050.9	73.6	95.8	21.2
Significance Thresholds	550	100	150	75	150
Threshold Exceeded	No	Yes	No	Yes	No

Table 4.4-13. Total Emissions from POLA Pier 400, Main Channel Borrow Pit, and Energy Island Southeast Borrow Pit Combined (Tons)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	21.27	99.48	3.90	7.13	6.65
Transport/Placement	27.76	152.96	10.58	15.25	10.59
Support Launches	4.18	24.26	1.89	2.61	1.70
Employee Commuting	3.12	0.22	0.03	0.24	0.02
TOTAL	56.32	276.93	16.40	25.23	18.95
TOTAL MITIGATED	56.32	235.42	16.40	21.48	4.75
Mitigated Quarterly	11.53	47.82	3.35	4.36	0.96
Significance Threshold (quarterly)	24.78	2.5	6.75	2.5	6.75
Threshold Exceeded	No	Yes	No	Yes	No

Mitigation Measures. A complete discussion of mitigation measures identified for this option is in section 4.4.5. The use of those mitigation measures would reduce NO_x emissions by 185.3 lbs per day, ROC emissions by 16.7 lbs per day, and SO_x emissions by 63.3 lbs per day, while the total dredging and placement emissions for this option would be reduced by 41.5, 3.7, and 14.2 tons, respectively. With the mitigation measures implemented, the emissions of NO_x and ROC would remain significant.

<u>LA-2</u>

Project Impacts. Under this option, all dredged material would be barged and dumped at a single placement site. The daily and total project emissions associated with use of the LA-2 site are presented in Tables 4.4-14 and 4.4-15, respectively. Because the emissions of NO_x and ROC, shown in Tables 4.4-14 and 4.4-15, are greater than the SCAQMD Significance Thresholds, emissions of NO_x and ROC would be significant.

Mitigation Measures. A complete discussion of mitigation measures identified for this option is in section 4.4.5. The use of those mitigation measures would reduce NO_x emissions by 181.6 lbs per day, ROC emissions by 16.9 lbs per day, and SO_x emissions by 62.4 lbs per day, while the total dredging and placement emissions for this option would be reduced by 58.0, 5.4, and 19.9 tons, respectively. With the mitigation measures implemented, the emissions of NO_x and ROC would remain significant.

Table 4.4-14. Daily Emissions for the LA-2 Option (Lbs/Day)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	66.5	311.0	12.2	22.3	20.8
Transport/Placement	143.8	792.3	54.8	79.0	54.9
Support Launches	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
TOTAL	242.6	1,211.9	75.5	113.9	83.2
TOTAL MITIGATED	242.6	1,030.2	75.5	97.0	20.9
Significance Thresholds	550	100	150	75	150
Threshold Exceeded	No	Yes	No	Yes	No

Table 4.4-15. Total Emissions for the LA-2 Option (Tons)

Emission Source	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Dredging	21.24	99.37	3.89	7.12	6.64
Transport/Placement	45.94	253.14	17.51	25.23	17.53
Support Launches	5.92	34.37	2.67	3.70	2.40
Employee Commuting	4.42	0.31	0.04	0.34	0.03
TOTAL	77.52	387.19	24.12	36.39	26.60
TOTAL MITIGATED	77.52	329.16	24.12	30.99	6.67
Mitigated quarterly	11.04	46.88	3.44	4.41	0.95
Significance Thresholds (quarterly)	24.75	2.5	6.75	2.5	6.75
Threshold Exceeded	No	Yes	No	Yes	No

4.4.3.2 Ancillary Facilities

Crude Oil Storage Tanks

Emissions from site preparation and installation of the storage tanks would be calculated as part of the project-specific environmental document prepared for these tanks. The following is a brief description of the types of emissions that would be expected from this activity. Grading activities during site preparation would result in fugitive dust (particulate matter) emissions due to ground-disturbing activities. Uncontrolled fugitive dust emissions occur at a rate of 1.2 tons per acre-month. Applying water to suppress fugitive dust emissions would effectively reduce such emissions by approximately 50 percent.

The heavy earth-moving equipment involved in site preparation and development would generate emissions of the same types of pollutants as discussed above for dredging and placement activities. The extent of emissions would depend on a variety of factors including the exact types of equipment, the number active simultaneously; their horsepower, load factor, and fuel type; and the duration of construction.

Staging Area

Air quality impacts from use of the staging area would depend on the number and type of emission sources associated with the staging area. Emission sources could include trucks carrying supplies for the project to the staging area, and supply boats ferrying supplies between the dredge and the staging area. While the quantity of emissions would depend on the number and type of such emissions sources and the factors listed above for equipment associated with construction of the storage tanks, these emissions would be negligible compared to the emissions from dredging and placement activities.

4.4.4 Long-Term Impacts

Long-term impacts from the project were assessed by comparing ship emissions from vessel operations allowed by the completion of the proposed dredging and ship emissions from vessel operations if the dredging did not proceed. A detailed description of the emission factors and data used to estimate the emissions can be found in Appendix C.

The deepening of the Queen's Gate approach channel would reduce emissions from both the baseline condition and the no-action alternative (Table 4.4-16). Since fewer ships would move the same amount of cargo, the emissions generated by ships would be reduced. The reduction in ship emissions in the year 2010 would range from a low of 1.17 tons per year of ROC to a high of 96.91 tons per year of SO_x for the baseline conditions, and from a low of 0.89 tons per year of ROC to a high of 72.88 tons per year of SO_x for the no-action alternative. The proposed action would therefore have a beneficial impact on the air quality in the SCAB.

Table 4.4-16. Projected Annual Ship Emissions Associated with Berth T121 in 2010 (Tons/Year)

Alternative	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Proposed Action	3.50	45.37	12.42	2.62	232.99
Change over Baseline Conditions	-1.69	-19.86	-5.22	-1.17	-96.91
No-Action Alternative	4.81	60.45	16.36	3.51	305.86
Change over No-Action Alternative	-1.31	-15.08	-3.94	-0.89	-72.88

4.4.5 Mitigation Measures

Since dredging and placement activities would exceed SCAQMD Emission Significance Thresholds for NO_x and ROC, mitigation measures were evaluated to determine if they would reduce project emissions to insignificance. The most feasible measures to reduce project emissions would be to (1) retard injection timing of diesel-powered equipment for NO_x control, and (2) use reformulated diesel fuel to reduce ROC and SO_2 emissions. Retarding injection timing by 2 degrees would reduce NO_x emissions by about 15 percent from diesel-powered equipment. Although retarding injection timing by more than 2 degrees would further reduce NO_x emissions, it was not considered due to fuel economy penalties. Use of reformulated fuel would reduce ROC and SO_2 emissions by 15 and 75 percent, respectively, from diesel-powered equipment (Southwest Research Institute 1991).

The use of hydraulic pipeline dredges was considered but deemed infeasible for the reasons outlined in Chapter 3. The use of clamshell dredges was also considered and deemed infeasible for the following reasons: (1) a large portion of the dredging is in open water and a clamshell dredge has difficulty operating in such conditions; (2) dredging would occur in a shipping channel and, since a clamshell dredge is immobile, it would interfere with shipping traffic; and (3) a clamshell dredge has a lower rate of production, requiring a much longer period of performance and higher associated costs.

Although electrification of diesel-powered dredges would eliminate a substantial amount of project emissions, this measure was eliminated from consideration due to the following reasons: (1) there are no electric self-propelled hopper dredges available, (2) expensive conversion or retrofitting of smaller diesel-powered dredges for electrical motors would increase the frequency of "downtime" during equipment operation, and (3) use of electric dredges would seriously limit competition of dredging contracts, increase project costs substantially, and delay project completion. Additionally, phasing of dredging activities, which would spread project emissions over a longer period and decrease daily emissions, was also deemed infeasible due to scheduling conflicts for limited dredge equipment. Although significant, dredging and placement emissions would be temporary, intermittent, and would cease on completion of project activities.

Daily emissions remaining after application of both injection timing retard and use of reformulated fuel, and mitigated total project emissions are shown in the tables in section 4.4.3.1. Application of injection timing retard and the use of reformulated fuel would reduce emissions of NO_x and ROC substantially, but not to levels of insignificance.

4.4.6 Project Consistency with AQMP

An Air Quality Management Plan (AQMP) for the SCAB was developed because the area is in non-attainment of certain ambient air quality standards, as discussed in section 4.4.1. The AQMP requires that emissions be reduced until the SCAB reaches attainment of these standards. Thus progress toward attainment is demonstrated in the AQMP by implementing control measures defined in the AQMP and by showing a decrease in future SCAB emission inventories. The emissions from an individual project, when combined with the total SCAB emissions for each source category, must remain below the forecasted emission levels, to show consistency with the AQMP.

One of the requirements established by the 1990 Amendments to the federal Clean Air Act (CAA) was an emission reduction amount, which would be used to judge how progress toward attainment of the ozone standards would be measured. The 1990 CAA requires areas in nonattainment of the NAAQS for ozone to reduce basinwide VOC (or ROC) emissions by 15 percent for the first 6 years and by an average 3 percent per year thereafter until attainment is reached. Control measures must be identified in the SIP that will facilitate the reduction in emissions and show progress toward attainment of the ozone standard.

Although temporary, short-term significant impacts on air quality would occur, the proposed action would increase the efficiency of moving cargo through the POLB over the long term. The larger tankers would be able to enter the POLB fully loaded, so fewer larger ships would be needed to move the same amount of liquid-bulk cargo. The increased efficiency would decrease long-term emissions per ton of cargo throughput, consistent with AQMP strategies to control emissions in the port area. In Figure 4.4-1, baseline (1994) emissions for both ships that would be affected by the project (i.e., ships docking at Berth T121) and all ships in the SCAB area (per the AQMP) are compared to projected ship emissions in the year 2010 under the proposed action, the no-action alternative, and for the SCAB area (per the AQMP). Because ship emissions under both the with-project condition and the no-action alternative are so much lower than total ship emissions in the SCAB, Figure 4.4-2 shows the same comparison using a

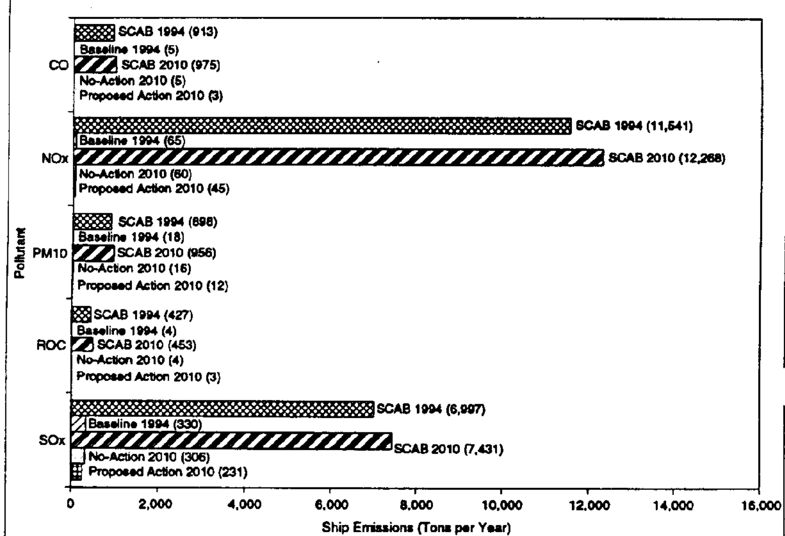


Figure 4.4-1. Comparison of Ship Emissions for the Proposed Action, No-Action, and South Coast Air Basin (SCAB) by Pollutant for the Years 1994 and 2010

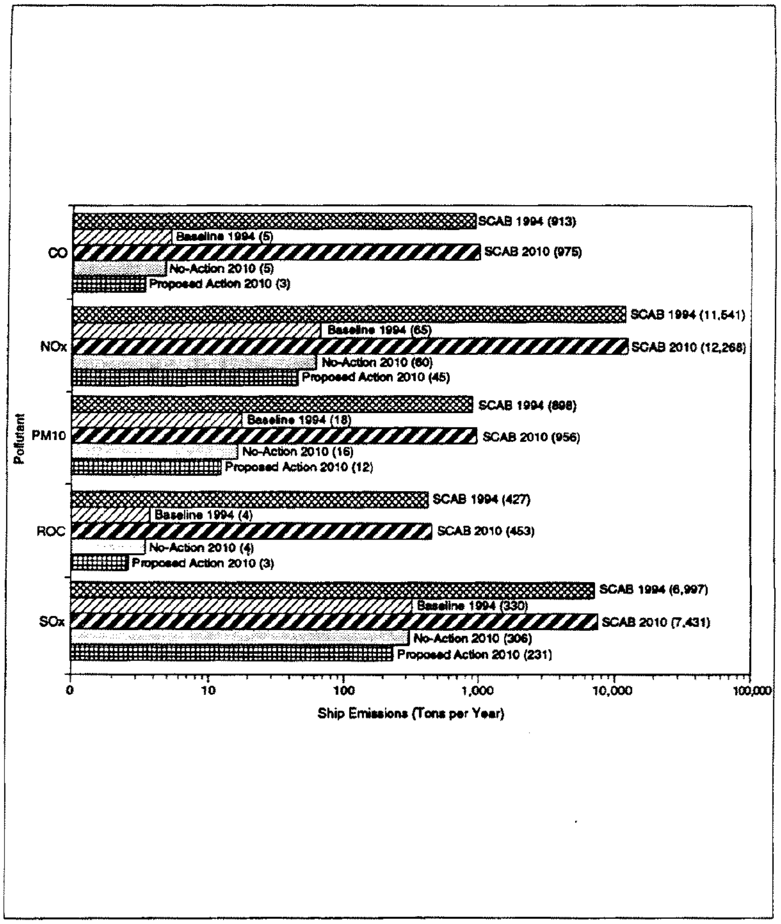


Figure 4.4-2. Comparison of Ship Emissions for the Proposed Action, No-Action, and South Coast Air Basin (SCAB) by Pollutant for the Years 1994 and 2010 (logarithmic scale)

logarithmic scale. Emissions are rounded to the nearest ton in these figures so they do not reflect changes in emissions of less than a half-ton between the years 1994 and 2010.

Figures 4.4-1 and 4.4-2 show that the project would result in lower ship emissions in the year 2010 compared to the no-action alternative, and that the with-project ship emissions are a very small fraction of total ship emissions in the SCAB. With respect to the requirement to reduce basinwide ROC emissions by 3 percent per year after 1996 until attainment is reached, the proposed action would result in a 31 percent reduction in ROC emissions in the year 2010 compared to 1994 levels In contrast, the no-action alternative would result in only a 7 percent reduction in ROC emissions over the same period. Since the deepening is expected to be completed in approximately 1999 (assuming construction begins in 1997 as planned), the 31 percent reduction in ROC emissions from the proposed action would occur over an 11-year period (1999 to 2010). While the project would not show a 3 percent annual reduction in ROC emissions, the CAA does not require each project to show a 3 percent reduction, only that *basinwide* there be a 3 percent reduction. The project would thus contribute toward the basinwide requirement to reduce ROC emissions 3 percent per year.

Because the project does not affect population densities, locations, and land use patterns identified in the Growth Management Plan, and helps decrease long-term emissions by increasing cargo movement efficiency, the project would be consistent with the AQMP.

4.5 NOISE

Noise is defined as unwanted sound that is usually caused by human activity and added to the natural acoustic setting of a locale. Noise is usually defined as sound that disrupts normal activities or that diminishes the quality of the environment. There are two types of noise sources: stationary and transient. Stationary sources are typically related to specific land uses; transient sources move through the environment along established paths or randomly. The total acoustical environment of a locale is the blend of the background or ambient acoustics with the unwanted noise. The human response to noise is diverse and varies with the type of noise, the time of day, and the sensitivity of the receptor. The decibel (dB) is the accepted standard unit for measuring the level of noise. It is generally adjusted to the A scale (dBA) to correspond to the range of normal human hearing. In this text, dB refers to dBA. For outdoor environments, where sound levels are continuously changing, the energy-equivalent noise level (L_{eq}) is a commonly used measure because it averages the level of sound from a variety of sources over a given period.

Slight changes in loudness are difficult to detect because the human auditory system has difficulty registering even a 2 dB change unless the two noise events occur within seconds. Under most conditions, a 5 dB change is required to be noticeable. Because of limited human sensitivity, when the sound level is doubled, as measured with a sound meter (a 3 dB increase), an individual perceives only a 25 percent increase in sound level. It requires a 10-fold increase in sound level (a 10 dB increase) to cause an individual to perceive a doubling in sound level.

4.5.1 Affected Environment

The region of influence for noise is defined as the area surrounding the dredge site, placement sites, transportation corridors, and ancillary facility sites, within which noise from the project could be heard above background noise; the size of this area would vary at each project site depending on the existing ambient noise. Noise sensitive receptors that could be affected by noise from project construction are included in the region of influence. Examples of noise sensitive receptors are residences, recreational areas (e.g., Long Beach City Beach), and public gathering places such as schools, hospitals, and libraries.

The noise in and around the POLB results from a wide variety of sources at the Port and in the surrounding communities. Primary noise sources at the Port include bulk loading facilities, shipping container handling equipment, bulk metal dumping, truck traffic, and occasional trains. In the residential neighborhoods of Long Beach, noise from the Port is heard as a steady, low noise in the background, punctuated by individual identifiable sounds, such as from a horn honking, the running of a ship's engine, or a train (COE 1992). The closest residential area to the dredge and placement sites is the West Village neighborhood located north of Ocean Boulevard and east of Shoreline Drive, over a mile away. In addition to sound generated by Port activities, the noise environments in the areas surrounding the Port are affected by vehicular traffic on the local streets, aircraft flying overhead, and other typical neighborhood noises. Outside the breakwater, noise sources would primarily include wind and wave activity and vessel traffic.

4.5.1.1 The Dredge Area

Noise in the area of the proposed dredge site results from vessel traffic and natural sources, such as the wind and waves. The land uses closest to the dredge site (marine terminals on Pier F and Pier J) are industrial in character, as are uses on the Naval Station Mole (with the exception of a recreation center).

No noise sensitive receptors are within the region of influence for the dredge site; the closest residential or recreational areas are approximately 14,000 feet (2.7 miles) from the dredge site.

4.5.1.2 Placement Options

Landfill in the Port of Los Angeles

The proposed landfill site would be located in the Port of Los Angeles at the approved Pier 400 landfill site. The North Channel area, where dredged material would be deposited before being transferred into the landfill, is located immediately north of the landfill and south of Pier 300. Pier 300, Reservation Point, and Fish Harbor are the closest areas to the proposed placement sites. Uses in these areas include port-related activities on Pier 300. To the northwest, the commercial and industrial area along Fish Harbor contains shipping, commercial fishing and processing facilities, a marina, yacht club, and other marine-related businesses and industry. To the west, on the far side of Reservation Point, uses include Immigration and Naturalization Service offices, and the U.S. Coast Guard Supply Center which supports three ships homeported at the base (personal communication, Lt. J. G. Schatz 1995). On the east side of Reservation Point, closest to the proposed placement site, the Federal Bureau of Prisons operates Federal Correctional Institution Terminal Island, housing 1,200 inmates. Eight single family residences and eight two- and three-bedroom apartment units located at the southeast end of Reservation Point house prison staff and families. These 16 units of housing are located approximately 1,000 feet from the channel placement site and are considered to be sensitive noise receptors. Existing noise sources in this area include birds and fog horns (personal communication, P. Protz 1995).

Borrow Pits

Main Channel Borrow Pit

The Main Channel borrow pit is located west of Pier F, which contains shipping terminals and facilities, and southeast of the Naval Station Mole. Gull Park is located at the east end of the Naval Station Mole, less than 500 feet northwest of this placement site. Operated by the Navy, the park contains two baseball fields, picnic tables, and restrooms. Previously used by sailors stationed at U.S. Naval Station Long Beach, the park is not open to the public and gets limited use due to closure of the Naval Station. The Navy plans to lease this area and unused portions of the mole, while retaining other areas, such as the fuel pier and tanks at Pier 12 and the Navy Yacht Club (personal communication, S. Hall 1995).

Energy Island Borrow Pits

The Energy Island borrow pits are located near Island White, which is approximately 2,500 feet offshore. Noise sources are primarily natural, with some noise from oil production on the Energy Islands. The nearest sensitive receptors are beach-goers at Long Beach City Beach, which, at its closest point, is approximately 1,000 feet from the north borrow pit. Ocean Boulevard traffic and beach recreational activity are the primary existing noise sources.

LA-2

The proposed LA-2 site is located in the ocean, approximately 8.7 miles from the center of the dredge area. Noise sources are primarily natural. No noise sensitive receptors are in the project vicinity. Any biological resources in the area would be acclimated to the noise of existing vessel traffic near LA-2, including vessels like a hopper dredge.

4.5.2 Impact Significance Criteria

The City of Long Beach Noise Ordinance does not set a decibel limit on construction activities and its regulations regarding when construction activities may occur do not apply within the Long Beach Harbor District boundaries (see discussion of local regulations in Appendix B). Since the local noise ordinance does not apply to the project, significance criteria for this project have been adapted from Federal Highway Administration Design Noise Level/Activity Relationships (FHWA 1982). Criteria have been identified for the types of receptors identified in the baseline analysis. For residences, recreation areas, hotels, motels, and similar areas, exterior noise levels greater than 67 dBA L_{eq} (hr) or interior noise levels greater than 52 dBA L_{eq} (hr) would be considered significant.

4.5.3 Construction Impacts

4.5.3.1 The Dredge Area

The noise source at the dredge site would be a 3,600-cubic yard capacity hopper dredge. Assuming the hopper dredge utilizes a diesel engine to power the dredging equipment, the noise from this source would be up to 87 dBA at a distance of 50 feet (COE 1995a). A combined total noise level from the dredge and support boats would be approximately 90 dBA at a distance of 50 feet from the center of the activity.

The land uses closest to the dredge site (marine terminals on Pier F and Pier J) are industrial in character. The closest sensitive receptors, beach-goers at Long Beach City Beach, are approximately 14,000 feet from the dredge site. Although an increase in short-term noise levels would occur in the area of the dredging, no adverse or significant noise impacts are anticipated due to the distance to sensitive receptors.

4.5.3.2 Placement Options

Transport time from the dredging site to the placement sites would be approximately one to two hours, depending upon which site is utilized. During transport, a 3,000-hp diesel engine operating at an 85 percent load factor is assumed to power the dredge vessel. The power ratings of the other equipment on the dredge vessel are as follows: jet pumps (565 hp), dredge pumps (1,700 hp), and other auxiliary and miscellaneous equipment (2,265 hp).

Once the dredge vessel arrives at the placement site, dumping would last approximately 15 minutes. Excavated material stored in the vessel hopper would be discharged at the placement site through a bottom dump. During dumping, the jet pumps and dredge pumps would be off, but the diesel engine used for propulsion and auxiliary power and miscellaneous equipment on-board would operate at low load factors. Reductions in the load factor, other than when it is zero (shut off), are assumed to have marginal effects on produced noise levels. The noise level of the hopper dredge vessel during dumping is assumed to be similar to that during dredging, 87 dBA at a distance of 50 feet. This would be comparable to a diesel-powered tugboat (COE 1995a). Use of an electric hydraulic pipeline dredge in addition to a hopper dredge at the Port of Los Angeles Pier 400 landfill site is assumed to create the same noise level as a hopper dredge. The impact at the placement sites is described below.

<u>Landfill in the Port of Los Angeles</u>

If the approved channel area and Pier 400 landfill are used for placement of dredged material, it is assumed that transportation of dredged material to this area would occur at least 1,000 feet from the 16 units of Bureau of Prisons employee housing located on Reservation Point. Reservation Point is located immediately west of the North Channel area into which the sediment would initially be placed by the hopper dredge. Assuming a distance of 1,000 feet, noise levels from transporting the dredged material would be approximately 62 dBA, and would be short term and not significant (to avoid significant short-term noise impacts on this housing area, at least a 600-foot distance would need to be maintained so that noise levels are less than the 67 dBA significance threshold for residential areas).

Borrow Pits

Main Channel Borrow Pit

The closest potentially noise-sensitive area, Gull Park, located at the east end of the Naval Station Mole, has minimal use due to closure of Naval Station Long Beach, is not open to the public, and may be leased in the future, with its continued use uncertain. It is thus not considered to be a sensitive receptor. Noise impacts from placement of dredged material at the Main Channel site would be negligible.

Energy Island Borrow Pits

The nearest sensitive receptors are beach-goers at Long Beach City Beach located approximately 1,000 feet north of the Energy Island north pit, at the closest point. Swimming is the most common activity at the Long Beach City Beach. The analysis indicates that disposal at this site would occur approximately seven times per day (about once every 3-4 hours over a 24-hour period), for about 470 days (see section 4.4.2, Air Quality, for construction source data). A beach-goer spending 6 hours on the beach would, on average, be exposed to only two placement operations. Noise levels are projected to be approximately 62 dBA at a distance of 1,000 feet from the dredge site. This noise level exposure is less than the 67 dBA threshold for significance at this type of recreation area. The southeast borrow pit would have lower noise levels than the north pit. Noise impacts from the two Energy Island borrow pits are considered to be short term and not significant.

LA-2

No sensitive receptors are in the vicinity of the LA-2 site. Noise increases would be short term and intermittent, and similar to the noise from existing vessel traffic in the area. No significant noise impacts would occur.

4.5.3.3 Ancillary Facilities

Crude Oil Storage Tanks

There is a potential for short term, significant noise impacts from construction of the storage tanks if residential, recreation, hotel/motel, school, or other noise-sensitive uses are located less than approximately 1,000 feet from the proposed storage tanks. This site is located outside Port boundaries. Although it is likely that the tanks could be constructed without creating a significant noise impact, project noise levels would have to be in compliance with local noise ordinances. Noise ordinances or guidelines regulating construction noise levels in the City of Carson, City of Los Angeles, or other applicable jurisdiction for this project would need to be considered in a future project-specific environmental document.

Staging Area

Noise impacts from use of the staging area on the Naval Station Mole would be short term and negligible, since the nearest noise sensitive area is 1/2-mile away.

4.5.4 Long-Term Impacts

On a long-term basis, the project would result in a decrease in vessel traffic and related noise because the same amount of cargo would be carried by fewer vessels that are more heavily loaded. There would be no long-term noise impacts associated with the project.

4.6 CULTURAL RESOURCES

Cultural resources include the remains of prior human activity. They can be found on land or submerged under water and can date from prior to European discovery (prehistoric) or since that time (historic). Examples include Native American settlements and activity areas, historic structures, and shipwrecks.

4.6.1 Affected Environment

A review of previous investigations performed in the project vicinity identified six shipwrecks that are known to have "accurate" (accurate within one mile) coordinates near the area of potential effects (APE). Of these resources, three are considered by the Minerals Management Service (Pierson et al. 1987) moderately significant or significant, two culturally insignificant, and the other has not been evaluated. An additional seven wrecks are listed that do not have relatively accurate locations, but may be within the project area. Of these, four are considered moderately significant, one insignificant, and two have not been evaluated.

A cultural resources survey conducted in March 1995 by Macfarlane Archaeological Consultants identified 31 "magnetic anomalies" during a sonar scan. One location within the dredge area, seafloor target no. 2, may be a shipwreck site, based on its scattered linear debris and related magnetic components. The location in 65 feet of water, extent of wreckage material, and amplitude of magnetic anomalies suggest that it may be associated with the shipwreck *Cricket No. 1*, built in 1863 and sunk in 1885. This wooden steam sidewheeler was used for towing vessels within Long Beach Harbor and is considered culturally significant (Pierson et al. 1987).

Another set of anomalies, seafloor targets 10 and 17, may be associated with a previously identified small vessel 35 feet in length. This vessel, though relatively small (less than 10 tons), has never been sufficiently recorded by sonar to permit an evaluation of significance. Other anomalies including buoys, seafloor cables, rock piles used for breakwater construction or repair, and small seafloor features without related magnetic anomalies identified during the survey are considered insignificant.

Another anomaly represented by scattered circular objects is presumed to be a bait barge known to have been lost near this location, and is not considered historically important due to its recent age and lack of historically distinguishing features.

4.6.2 Impact Significance Criteria

The project will have a significant effect on cultural resources if it will disturb, remove from original context, or introduce incompatible elements out of character with any property considered either eligible for the National Register of Historic Places or important under CEQA Appendix K (Archaeological Resources) criteria. According to the National Register criteria, a significant cultural resource has integrity and contains one of the following qualities:

- Is associated with events that have made a significant contribution to the broad patterns of history; or

- Is associated with the lives of persons significant in the past; or

- Embodies the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

- Has yielded, or may be likely to yield, information important in prehistory or history.

CEQA Appendix K criteria are similar and define an important archaeological resource as one which:

- Is associated with an event or person of:

  1. Recognized significance in California or American history, or
  2. Recognized scientific importance in prehistory.

- Can provide information which is both of demonstrable public interest and useful in addressing scientifically consequential and reasonable or archaeological research questions;

- Has a special or particular quality such as oldest, best example, or last surviving example of its kind;

- Is at least 100 years old and possesses substantial stratigraphic integrity; or

- Involves important research questions that historical research has shown can be answered only with archaeological methods.

4.6.3 Construction Impacts

4.6.3.1 The Dredge Area

Even though the *Cricket No. 1* is considered to be potentially significant, it has not undergone a formal determination of National Register eligibility process. Further studies are necessary to first verify the identity of seafloor target 2. If the target is identified as the *Cricket No. 1* and it retains sufficient integrity to provide information about the past, a determination of eligibility for National Register listing would need to be formalized.

If seafloor target 2 is the *Cricket No. 1* and it is determined to be eligible for listing in the National Register of Historic Places and/or it is an important archaeological resource under CEQA, dredging associated with the channel deepening project would have an adverse effect on the historic property. To take into account adverse effects on the *Cricket No. 1*, a memorandum of agreement (MOA) between the LAD, the State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (Council) would need to be executed. The MOA would stipulate development of a treatment plan to mitigate adverse effects on the *Cricket No. 1*. Approval of the treatment plan would be required by the LAD, the SHPO, and the Council. Resources associated with seafloor targets 10 and 17, if significant, would be subject to the MOA guidelines as well.

4.6.3.2 Placement Options

Dredged sediments would be placed in an existing footprint that has been created in the Port of Los Angeles for the Pier 400 landfill, in existing man-made borrow pits where sediments have been historically removed for filling uses elsewhere (Main Channel borrow pit, Energy Island borrow pits), or in an existing ocean disposal site (LA-2). Extensive ground disturbances have occurred at all of these sites. Any cultural resources that previously existed have been removed. As a result, no impacts would result from placement of dredged sediments at these sites.

4.6.3.3 Ancillary Facilities

Crude Oil Storage Tanks

This site currently is a parking lot. Ground disturbances associated with construction of the existing parking lot including grading, compaction, and surfacing would have disturbed surface soils approximately 18 inches deep. Any cultural resources within this depth would have been destroyed. Potential impacts of constructing the crude oil storage tanks could exceed this depth. The likelihood of encountering cultural resources at this industrial location is low, but cannot be fully eliminated. A more extensive analysis would be required in a subsequent environmental document to determine the potential for cultural resources in this area. Impacts on cultural resources are potentially significant if they exist below the historical area of disturbance.

Staging Area

This facility has been paved and is currently vacant. No further grading or ground disturbance would be required for use of this site as a staging area. It is located on fill, and therefore does not have the potential to contain intact cultural resources. No impacts on cultural resources would result from use of this area.

4.6.4 Long-Term Impacts

After construction and placement of dredged sediments, no additional disturbances to ground surfaces would result. There would thus be no long-term impacts on cultural resources.

4.7 SOCIOECONOMICS

4.7.1 Affected Environment

The geographic region of influence for socioeconomics is the Los Angeles consolidated metropolitan statistical area (MSA) identified by the Southern California Association of Governments (SCAG). It includes Los Angeles, Orange, San Bernardino, Riverside, and Ventura counties.

4.7.1.1 Five-County Region

The economy of the five-county region is one of the largest and most diverse in the nation. Between 1983 and the early 1990s, this region experienced steady employment growth. The labor force stabilized, and in some areas, declined in the early 1990s, but the total labor force has increased recently with an associated drop in unemployment rates. In 1993, the total labor force in the five counties was 7,352,500, up slightly from 7,349,300 in 1992 (California Employment Development Department 1993, 1994a, 1994b, 1994c, 1994d; personal communication, M. Stewart 1994). It increased more substantially in 1994 to 7,479,900. Unemployment rates remained relatively stable between 1992 and 1993, although generally higher than the nationwide rate of 6.8 percent. Unemployment rates for Orange, Ventura, San Bernardino, Riverside, and Los Angeles counties were 6.7, 8.8, 9.5, 11.7, and 9.7 percent, respectively, in 1993. Unemployment declined in 1994; rates for the above-mentioned counties were 5.1, 7.6, 7.1, 10.1, and 7.8 percent, respectively (California Employment Development Department 1994c).

Economic activity in the regional area is broadly distributed across the service, manufacturing, retail trade, and government portions of the regional economy. Recent forecasts show that this diversity will continue to permit growth in the regional economy despite the decline of traditional growth industries, such as construction and aerospace. Long-term forecasts for the regional area economy indicate an increase in total population and employment through the year 2015 but a decrease in Los Angeles County's share of these totals (SCAG 1994). Total employment in Los Angeles County is projected to increase from 4,610,000 in 1990 to 5,912,000 in 2015.

4.7.1.2 Port of Long Beach

The Port of Long Beach serves a U.S. market extending from the Pacific Ocean east to the Rocky Mountain Range. During 1994, the last full calendar year for which statistics are available, the Port handled 79.0 million metric revenue tons of shipping, including 49.2 million metric revenue tons of container cargo (POLB Finance Division 1995). This activity generates employment, earnings, and tax revenues in the project region. Purchases by employees and businesses associated with the Port's international trade activity also contribute to the regional economy. In 1993, the most recent year for which an economic impact analysis was completed for the ports, a total of $50.0 billion in sales revenues was generated throughout the five-county region from activities associated with the operations of the Ports of Long Beach and Los Angeles (LBHD and LAHD 1995). More than $2.0 billion in state and local taxes are generated throughout the five-county southern California area. In addition, Port-related payrolls were $8.1 billion. A substantial number of workers are directly or indirectly associated with the San Pedro Bay Ports, including both the Ports of Long Beach and Los Angeles. In 1993, 500,000 employees within the five-county area were linked to the ongoing operations of the two ports. These economic impacts include both direct and indirect effects resulting from Port industry, Port capital spending, Port tenants, and inbound and outbound Port users.

4.7.2 Impact Significance Criteria

Economic effects in themselves are not considered effects on the environment and thus no significance criteria have been established. Where impacts on related resources occur that could be considered direct effects on the environment (e.g., loss of a recreational use) that are separate from strictly economic impacts (e.g., loss of revenue from a recreational use), then impacts are addressed in that resource section.

4.7.3 Construction Impacts

4.7.3.1 Port of Long Beach

Employment resulting from the projected 16- to 22-month dredging schedule is projected to be 20 persons. This increase would be short-term and could utilize labor available in the region, with no changes to population and housing conditions in the region. Additional economic benefits would result from purchases of construction materials and other services.

4.7.3.2 Placement Options

Socioeconomic effects of the project on activities in the Port and five-county region would not differ by placement site, and are addressed above under section 4.7.3.1 for the POLB. However, placing the dredged material at the farther LA-2 site would result in higher transportation costs (about $3.50 per cubic yard) compared to the closer borrow pit sites (about $2.25 per cubic yard) (COE 1995c).

4.7.3.3 Ancillary Facilities

The socioeconomic impact of the proposed crude oil storage tanks would be evaluated when the project-specific environmental document is prepared for these tanks. There would be no socioeconomic impact associated with use of the staging area.

4.7.4 Long-Term Impacts

Long-term socioeconomic impacts would be beneficial. The economies of scale possible with the use of larger ships would result in lower transportation costs. After the proposed deepening, there would be an annual net benefit of $29.5 million in cost savings associated with crude oil transportation. This net benefit accrues after assigning the cost of the dredging and disposal project. The net benefit would recirculate in the national economy through respending and investment effects.

4.8 LAND AND WATER USE

The land and water use analysis, which includes recreational uses, addresses current and future uses of property within the POLB jurisdiction, uses of adjacent properties that could be affected by the Queen's Gate deepening project, and uses of the potential sediment disposal sites. The consistency of the proposed action with applicable plans and policies is discussed in section 4.8.5.

Other considerations related to land and water use and the sections in which they are addressed are as follows: commercial fishing, discussed under marine resources (section 4.3); noise (section 4.5); ground transportation (section 4.9); vessel transportation (section 4.10); and aesthetics (section 4.11).

4.8.1 Affected Environment

The region of influence, or potentially affected area, includes the POLB, the POLA near Pier 400, nearshore water areas in San Pedro Bay between the ports and Peninsula Beach, and the offshore waters approximately 7 nautical miles (nm) to the LA-2 site.

4.8.1.1 Port of Long Beach

Port Facilities and Uses

The POLB is composed of about 3,000 acres of land (39 percent of the total acreage) and 4,600 acres of water (61 percent of the total acreage) (personal communication, Robert Kanter 1994). The following description of land and water uses in the Port is from the Deep Draft Navigation Improvements EIS/R (COE and POLA 1992). POLB land uses are divided into eight categories. Major uses are primary port (34 percent of land), oil and gas production (24 percent), federal land (17 percent), and port-related industries and facilities (10 percent). Minor uses include commercial/recreational facilities (5 percent), utilities (4 percent), non-port-related facilities (4 percent), and hazardous cargo facilities (2 percent).

The federally owned Long Beach Naval Shipyard is within the boundaries of the Port. The Long Beach Naval Station immediately to its west was closed in September 1994 due to a decision by the Base Closure and Realignment Commission (BRAC), although the fuel depot on the Navy Mole and the Supply Center remain. The properties associated with the closed Naval Station were transferred to the Naval Shipyard.

The Port Master Plan identifies 11 geographical planning districts (see Figure 4.8-1). The function of these districts is to group similar and compatible land and water uses, encourage the efficient utilization of existing Port facilities, encourage multicompany use of terminals, and isolate hazardous cargo areas. There are three planning districts (Districts 7, 9, and 11) that are in the vicinity of either the proposed dredge area or the potential sediment placement sites in San Pedro Bay. Detailed descriptions of all 11 planning districts are contained in the Port Master Plan (POLB 1990).

District 7: Queensway Bay Planning District. The Energy Island borrow pit sites are outside and east of this district. Included in this district are the *H.M.S. Queen Mary* and associated recreational facilities. Permitted uses include recreational, commercial, primary port facilities, oil production, and ancillary port facilities. Goals include increasing this area's use for coastal-related commercial and recreational uses.

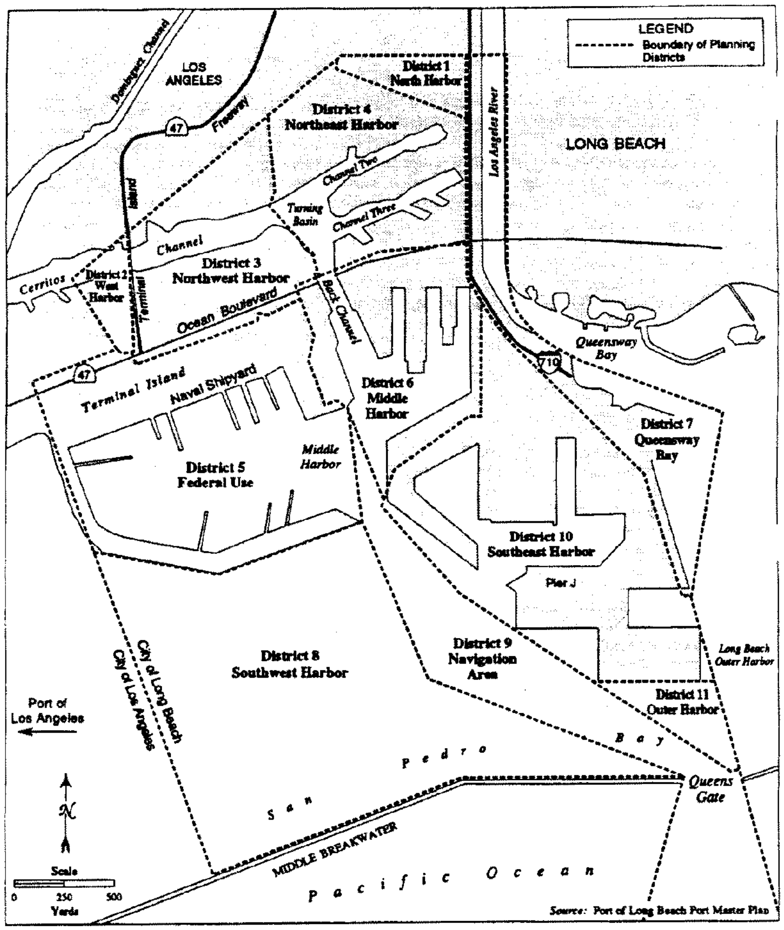


Figure 4.8-1. Port of Long Beach Planning Districts

District 9: Navigation Planning District. The proposed dredge area and the Main Channel borrow pit is located in this district, which contains the main channel linking Queen's Gate to other portions of the harbor. The channel width varies from 400 feet to 1,400 feet, with an average depth of 76 feet. This district provides direct deep-draft access to the Southeast Basin, Middle Harbor, Southwest Harbor, and the Federal Use Area. The permitted use is navigation. Goals are to continue to maintain and improve access for vessels entering and leaving the Port complex.

District 11: Outer Harbor Planning District. The northern portion of the proposed dredge area would encroach into the southern tip of this small district. This water area adjoins the most southerly portion of Pier J. Permitted uses are navigation and maneuvering. Goals are to maintain and improve vessel access and manageability.

The POLB zoning policies conform with City of Long Beach policies (POLB 1990). All land within District 7 is in the CT zone (tourist commercial), and the remainder of the Port is zoned MP (port manufacturing).

Recreational Facilities and Uses

Recreational activities account for most of the land and water uses in the project area, especially outside the immediate area of the Port. Recreational uses encompass onshore and nearshore activities. Onshore recreational resources include beaches, parks, recreational facilities, and other visitor-serving attractions such as the *H.M.S. Queen Mary*. Shoreline Village, public campgrounds, fishing areas, hotels, and restaurants are located along Queensway Bay. Recreational opportunities involve passive activities such as sightseeing, sunbathing, beachcombing, and picnicking. Active uses in the onshore and nearshore areas are swimming, body and board sailing, shoreline and pier fishing, and beach volleyball. Shoreline and nearshore uses that depend on land-based operations include such activities as sportfishing, commercial cruises, tour boats, boating, and sailing.

Three marinas are located in the area and contain a total of 5,855 boat slips. Several boating organizations represent and sponsor various activities such as sailboat regattas, day sailing events, power-boat cruising, and offshore power-boat racing. The Southern California Yachting Association (SCYA) had 71 scheduled sailboat events in Long Beach in 1988. It is estimated that between 25 and 200 boats participate in each of these events (SCYA 1988), and courses may be located inside or outside the breakwaters.

In Long Beach Harbor, several major charter boat companies provide passenger and charter service to Avalon and Isthmus Cove on Santa Catalina Island. These recreational charters also serve specialized activities, including sportfishing, scuba diving, whale watching, and harbor touring. Sportfishing and whale-watching cruises are located near the Pier C Street Terminal, along with restaurant facilities. The companies operate daily, although peak operations are during the summer months and on weekends. Fishing also occurs from private boats at various locations throughout the harbor. The predominant areas for these activities are adjacent to the Long Beach breakwater and along the Long Beach City Beach shoreline. Anglers can engage in these activities all year.

The *Queen Mary*, a historical monument, attracts visitors at an annual rate of approximately 1.5 million persons each year. A portion of the *Queen Mary* is currently used as a hotel and restaurant and operated by RMS Foundation, Inc. It is anticipated that future development of this area leased to RMS Foundation, Inc. and neighboring properties would be used for additional visitor-serving and commercial uses, as part of the Queensway Bay Master Plan.

4.8.1.2 The Dredge Area

The dredge site is located in District 9 of the Port's planning districts. Most of this site lies outside the Queen's Gate Entrance. The primary use of this area is commercial shipping navigation. Secondary uses would include recreational boating, and sportfishing in the general area.

4.8.1.3 Port of Los Angeles Pier 400

The following description of the land and water uses in the vicinity of the Pier 400 landfill is from the Final EIS/R for the Deep Draft Navigation Improvements (DDNI) project (COE and LAHD 1992). The POLA covers over 7,500 acres of land and water, and 28 miles of waterfront. The Port is divided into 10 development areas, each of which has long-range preferred uses. The Pier 400 landfill area is in Area 9 (Terminal Island/Seaward Extension), which is described below (more detailed descriptions are found in the *Port of Los Angeles Master Plan* [1979] and the *City of Los Angeles General Plan - Port of Los Angeles* [1982]). Most of the POLA is zoned M2 (light industrial) or M3 (heavy industrial). The use of the waters within the Port is governed by several entitites including the U.S. Coast Guard (navigation), the California Coastal Commission (permitting, Local Coastal Plans), the POLA, and the City of Los Angeles.

POLA development Area 9 (Terminal Island/Seaward Extension) includes a portion of the southern end of Terminal Island (Pier 300) and water area which is being filled to create Pier 400 (creation of Pier 400 was part of the proposed action analyzed as part of the DDNI project noted above. Current uses in the northern portion of Area 9 include the U.S. Customs facilities, the Terminal Island Treatment Plant, automobile storage, and a least tern nesting area. The northeast portion of Pier 300 was used for dry bulk (coal/coke) storage. As part of the DDNI project, a new dry bulk facility and 1.5 new container terminal modules were to be created on Pier 300. The DDNI also involves creation of 582 acres of new landfill, an access corridor, surface transportation facilities (an Intermodal Container Transfer Facility), and deepwater access to Piers 300 and 400. Pier 400 would be used for liquid bulk and container terminals; the liquid bulk facilities would be located on the southernmost extension of Pier 400.

4.8.1.4 Borrow Pits

As noted above, the Main Channel borrow pit is located in Port District 9, and this area is used for commercial shipping navigation.

The Energy Island borrow pits are located adjacent to District 7. Aside from possibly some recreational fishing in the general area, these pits are not likely to have other uses.

4.8.1.5 LA-2

LA-2 is an EPA-designated ocean site for placement of dredged material from the Ports of Long Beach and Los Angeles. The site was formally designated by EPA for this use in early 1991. The following description of this site and its historical use is from the EIS prepared for the original designation of this area as an ocean dredged material disposal site (ODMDS) (EPA 1988).

Prior to its formal designation as a disposal site, LA-2 had been used as an interim disposal site since 1977. The 1988 EIS indicated that, after designation, the site was expected to be used a few days or weeks a year, and that sediment would be transported by split-hull barges with volumes of 500 to 4,000 cubic yards (cy), which would be towed to the site by tugboats. When the 1988 EIS was prepared, approximately 200,000 cy of dredged material was expected to be dumped at this site per year; in fact, the actual use of the site since its designation has been approximately 500,000 to 600,000 cy per year. The site was intended primarily for disposal of maintenance dredging material (personal communication, Alan Ota 1994).

There is commercial fishing in the vicinity of the site, with the catch consisting primarily of pelagic species; Pacific bonito, Pacific mackerel, jack mackerel, northern anchovy, and market squid make up the bulk of the catch. Purse seiners and gill net fishermen use the general area. The only bottom fishery operating in the area is a trap fishery for spot prawns, which operates on the continental slope in depths similar to the LA-2 site. Other fish caught include Pacific mackerel, unspecified rockfish, and spotted scorpion fish (EPA 1988).

Because of its distance from shore and its depth, sportfishing and boating are the only two recreational activities that occur in the vicinity of LA-2. The next nearest popular sportfishing area, Horseshoe Kelp, is located approximately 4 nm northeast of LA-2 over a hard-bottom area.

LA-2 is located along the route recreational boaters take from Los Angeles and Long Beach harbors to the offshore islands. These islands are one of the major destinations for recreational boaters. Santa Catalina is the most visited destination of the islands because landing there is relatively unrestricted and major anchorages are located at Avalon and Two Harbors. Boats usually follow a straight route between the harbor or marina on the mainland to the harbors at Santa Catalina Island. From the Los Angeles and Long Beach harbors, this route passes over or very close to the LA-2 site. In addition to privately owned pleasure boats, regular ferry service is available to Santa Catalina Island from Los Angeles, Long Beach, and Newport Beach harbors.

The site is located within a mile of the southbound lane of the Santa Barbara Channel vessel traffic separation scheme (TSS) established by the U.S. Coast Guard, and a little over a mile from the southwestern corner of the precautionary area. Despite the site's proximity to the TSS, vessel traffic interference has been insignificant despite considerable use of nearby areas by commercial, military, and recreational vessels. Oil and gas lease tracts, offered in OCS Lease Sale 80 in October 1984, are located in the general offshore area, although neither the tract containing LA-2 nor any in the general vicinity of this site were leased in the sale. There is no offshore oil and gas development at or immediately adjacent to the site.

4.8.2 Impact Significance Criteria

Impacts are considered significant if the project substantially conflicts with existing or planned land uses, including recreational uses. Under NEPA, the loss of a recreational facility is considered a significant impact on the human environment. Appendix G of the CEQA Guidelines lists as a significant effect "conflict with established recreational, religious, or scientific uses of the area." For the purposes of this discussion, the loss of recreational opportunities shall be considered a significant impact under both NEPA and CEQA.

4.8.3 Construction Impacts

4.8.3.1 The Dredge Area

Since the primary use of the proposed dredge area is commercial shipping into and out of the POLB, the deeper channels would facilitate this use. This beneficial impact on vessel transportation is discussed in section 4.10.2.2. No channel closures are anticipated due to the dredging. Potential impacts during the dredging on recreational boating and sportfishing would be temporary and adverse but not significant. Most of this impact would be experienced during the summer and on weekends throughout the dredging period, the times when most recreational boating, fishing, and diving occurs. Since there will be only one dredge and it will move slowly along the approach channel, recreational users of this area should be able to easily maneuver around it. Also, the *Notice to Mariners*, published periodically, would identify to boaters the location of the dredge throughout the dredging period.

4.8.3.2 Placement Options

Landfill in the Port of Los Angeles

A hopper dredge would make between six and seven trips per day for almost 6 months to place the material initially into the North Channel area of POLA (with subsequent transferal to the adjacent Pier 400 area). Transporting the material to this site would thus involve up to seven additional vessel trips per day through an area whose main use is commercial navigation. These few daily trips would represent a very small increment to the number of commercial vessel movements in the POLA and POLB (see Table 4.10-1). The impact of these additional vessel movements would therefore be adverse but insignificant.

Borrow Pits

A hopper dredge would make about eight trips per day to the Main Channel borrow pit over almost 5 months, and about seven trips per day to the Energy Island borrow pit over approximately 4 months to place the dredged sediment. Since the use of the Main Channel borrow pit area is commercial navigation, there would be no impact on water use near this placement site other than the need for other vessels in the area to avoid the dredge, an insignificant impact (see section 4.10). The dredge's presence would cause temporary, adverse but not significant impacts on any sportfishing in the immediate vicinity of the Energy Island pit. Since any sportfishing in the borrow pits occurs very sporadically, these recreational activities could easily move to a comparable nearby area, including other borrow pits.

LA-2

A hopper dredge would make about five trips per day to LA-2 for approximately 21 months to place the dredged sediment. Impacts on recreational uses of this area would be temporary and adverse but not significant. The recreational activity most likely to be affected by use of this site is pleasure boating, particularly boats traveling between the Ports of Los Angeles and Long Beach as well as Orange County harbors to Santa Catalina Island (EPA 1988). However, the dredge would dump its load quickly at the LA-2 site and so, for the most part, would be just one other vessel moving about in the offshore area. Sportfishing in the area is rare due to the depth (EPA 1988), so there should be little or no impact on that activity. While there is the potential for an accident between the hopper dredge and recreational boaters/sportfishermen in the area, the probability of such an event is very low because the dredge would be at the LA-2 site only briefly each trip and should be able to easily avoid other boats there because the disposal site is large (2.38 square miles). Although OCS lease sales could potentially be held as early as 1996, because of the long lead time between a lease sale and actual development of the lease, any offshore oil and gas development in the vicinity of LA-2 would likely not occur until after the project. Consequently, there would be no use conflicts between the project's use of this site and possible future oil and gas development in this area.

4.8.3.3 Ancillary Facilities

Construction of the crude oil storage tanks would preclude use of this site as a parking area. The extent of this impact would depend on the degree to which the existing parking area is used and whether there are nearby parking areas motorists could use instead. If parking is in short supply in this area and there is no other parking area that could be used instead, the impact could be significant. If the parking lot is not fully used and there is sufficient parking space in the vicinity that could be used instead, the impact would be negligible.

Since the proposed staging area on the Navy Mole is currently vacant and has been recently used for industrial purposes, use of this area to stage activities and store supplies for the project would have no impact on current land uses.

4.8.4 Long-Term Impacts

Aside from the crude oil storage tanks, the project would have no long-term impacts on land use. The storage tanks could have a long-term impact on land use if the existing parking is needed in the area. The extent of the impact would depend on how much the parking area would expect to be used in the future and whether there is another parking area nearby that motorists could use if this area became unavailable. If this parking area were considered surplus (i.e., not needed), there would be no long-term impact on land use. The extent of any potential long-term impacts associated with the crude oil storage tanks would be determined in the project-specific environmental document prepared for these tanks.

4.8.5 Project Consistency with Plans and Policies

Federal Coastal Zone Management Act

A coastal consistency determination has been prepared for the project (see Appendix G).

California Coastal Act

Since the dredge site and all the placement sites except LA-2 are located within 3 miles of shore, they are in the coastal zone. The policies of the California Coastal Act apply to areas within the coastal zone unless there is an approved Local Coastal Plan (LCP) for the site. The Port Master Plan (POLB 1990) serves as the POLB's LCP. Since the jurisdiction for an LCP ends at the mean high tide line, placement of dredged sediment anywhere from the mean high tide line out to 3 miles offshore would be subject to the policies of the California Coastal Act, although any applicable LCP policies would serve as guidelines (personal communication, Steve Rynas 1994). The dredge site and the borrow pit disposal sites are thus subject to the policies of the California Coastal Act. Two chapters of the Coastal Act are pertinent to the proposed project: Chapter 3 (Coastal Resources Planning and Management Policies) and Chapter 8 (Ports).

In Chapter 3 of the Coastal Act, section 30233 addresses dredging and filling of coastal waters. Section 30233(a) states that dredging and filling of coastal waters is permitted provided that there is no feasible less environmentally damaging alternative and that feasible mitigation measures have been provided to minimize adverse environmental effects. Chapter 3 of the EIS/R explains why there are no feasible less environmentally damaging alternatives, and feasible mitigation measures to reduce significant impacts are discussed by resource elsewhere in chapter 4 of the EIS/R.

Dredging and filling allowed by the Coastal Act is limited to certain types of activities, one of which is *new or expanded port, energy, and coastal-dependent industrial facilities* [section 30233(a)(1)]. Since the deepened approach channel could be considered an expanded port facility, the proposed project would be consistent with this policy.

Section 30233(b) states that:

> *Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation.*
>
> Dredging and disposal can be done in a manner that avoids significant disruption to marine and wildlife habitats (see section 4.3) and water circulation (see section 4.2). The project would thus be consistent with this policy.

The policies affecting port development are contained in Chapter 8 of the Coastal Act. Section 30701 states that *existing ports shall be encouraged to modernize and construct necessary facilities within their boundaries . . . to minimize* the necessity of creating new ports elsewhere in California. The proposed project would modernize the approach channel and would improve movement of cargo in and out of the Port. The project would improve vessel access to primary port facilities, and thus reduce the need for new ports in new areas of the state.

Section 30705(a) states that *water areas may be diked, filled, or dredged when consistent with a certified port master plan*, and only under certain conditions. One condition is:

> *Such construction, deepening, widening, lengthening, or maintenance of ship channel approaches, ship channels, turning basins, berthing areas, and facilities as are required for the safety and the accommodation of commerce and vessels to be served by port facilities* [section 30705(a)(1)].
>
> The dredging would be consistent with the Port Master Plan (see below). The deeper channels would make vessel transportation and cargo handling at the Port more efficient, and would improve vessel safety by reducing vessel delays due to tides. The project is thus consistent with this policy.

Section 30705 states that:

> *Dredging shall be planned, scheduled, and carried out to minimize disruption to fish and bird breeding and migrations, marine habitats, and water circulation. Bottom sediments or sediment elutriate shall be analyzed for toxicants prior to dredging or mining, and where water quality standards are met, dredge spoils may be deposited in open coastal water sites designed to minimize potential adverse impacts on marine organisms . . .* [section 30705(c)].
>
> As noted above under Coastal Act section 30233(b), dredging can be done in a manner that minimizes disruption to marine habitats and water circulation, and there should be no impacts on fish and bird breeding and migrations. Bottom sediments have been analyzed for toxicants (Sea Surveyor, Inc. 1994), and water quality standards will be met.

Section 30705 also states:

> *For water areas to be diked, filled, or dredged, the [Coastal] Commission shall balance and consider socioeconomic and environmental factors* [section 30705(d)].
>
> The Coastal Commission will consider the socioeconomic and environmental factors of this project when the Commission considers the project for consistency certification.

Section 30708 states that *all port-related developments shall be located, designed, and constructed so as to:*

> *Minimize substantial adverse environmental impacts; and minimize potential traffic conflicts between vessels.*
>
> This EIS/R contains mitigation measures to minimize substantial adverse environmental impacts. The deeper approach channel would reduce the extent of vessel traffic conflicts by allowing supertankers to enter and exit the Port fully loaded.

Port Master Plan

The California Coastal Act of 1976 required the Port to produce a Master Plan outlining its plans for land use within the Harbor District. The Port Master Plan is the primary planning guide for development within the Port. The Plan was certified by the California Coastal Commission (CCC) in 1978, with major updates in 1983 and 1990 (POLB 1990). Because of the dynamic nature of world commerce, many trade and transportation practices change quickly. For this reason, the Master Plan was written to encompass broad Port goals, as well as specific projects that were anticipated at the time of the Master Plan's development. The Plan establishes permitted uses within each planning district, along with long-term planning policies. Goals include maximizing the movement of goods through the Port to benefit the local, regional, and national economies; maintaining the ability to accommodate the various types of commodities; providing facilities such as deep-water channels and berths to accommodate the latest trends in shipping technology; and fostering and encouraging development of commerce and navigation. Goals of the Port Master Plan include those below.

- Remain current to the changing needs of the maritime industry with respect to deep-water access to commercial berths and anchorage areas by deepening channels to accommodate existing and future tanker, dry bulk, and general cargo fleets.
- Continue to facilitate access to anchorage areas within and adjacent to the harbor.
- Minimize vessel congestion possibilities by properly coordinating and arranging ancillary Port uses (i.e., sportfishing, marine contracting, etc.) to complement primary port activities.

The 1990 Master Plan Update includes specific projects that were anticipated through 1995. While the proposed project was not one of these anticipated projects, as noted above one of the goals of the plan is to deepen channels to accommodate the existing and future tanker fleet. The 1990 Update includes the following goal and related objective pertinent to the proposed project.

Goal 4: *Provide for the safe cargo handling and movement of vessels within the Port.*

Objective a: *Deepen channels and basins to accommodate supertanker and post-panamax vessels.*

The following goal and related objective are specific to Planning District 9 in which the proposed dredge area is:

Goal: *Maintain and improve access for vessels entering and leaving the Port.*
Objective: *Plan and design for accommodating increased channel depths to handle larger liquid and dry bulk vessels.*

The proposed deepening would be consistent with these goals and objectives of the Port Master Plan.

2020 Plan

The 2020 Plan outlines the presently anticipated land and ship channel needs of the Ports of Long Beach and Los Angeles through the year 2020. These needs are based on economic forecasts and cargo projections estimated for the next 25 years. The 2020 Plan identified the need for deeper channels; the proposed project represents part of this needed channel deepening. As individual projects are developed in accordance with the 2020 Plan, they will be certified in amendments to the Port Master Plan and project-specific environmental documents.

City of Long Beach General Plan

The Long Beach Harbor area is designated in the City of Long Beach General Plan within Land Use District (LUD) Number 12. This district is composed of the existing freeways, the Long Beach Harbor, and the Long Beach Airport. The General Plan assumes the water and the land use designations within the harbor area are separately formulated and adopted by due process as the Specific Plan of the Long Beach Harbor (also known as the Port Master Plan, as amended). The General Plan indicates that the responsibilities for planning within legal boundaries of the harbor lie with the Harbor Commission. The proposed project would further the goals of the General Plan by increasing cargo handling efficiency.

Air Quality Management Plan

The Environmental Protection Agency (EPA), in enforcing the mandates of the federal Clean Air Act, requires each state that does not attain National Ambient Air Quality Standards (NAAQS) to prepare a plan detailing how these air quality standards will be attained. The State of California requires each air quality district to prepare an Air Quality Management Plan (AQMP) specific for its region. The South Coast Air Quality Management District (SCAQMD) and the Southern California Association of Governments (SCAG) jointly prepared the AQMP for the South Coast Air Basin (SCAB), which includes the Port area. The AQMP has been submitted to the California Air Resources Board for review, approval, and integration into the State Implementation Plan (SIP) for air quality. The proposed project is consistent with the AQMP because, by increasing efficiency in vessel operations, it would decrease long-term emissions per ton of cargo throughput, which is consistent with AQMP strategies to control emissions in the Port area.

Regulatory Setting for Placement at POLA Pier 400

Placement of the dredged material in the POLA for Pier 400 would be subject to the requirements (including mitigation commitments) developed for the DDNI project (COE and LAHD 1992).

Regulatory Setting for Placement at the Borrow Pits

Placement of the dredged material at the borrow pits would be subject to the requirements of the federal Clean Water Act, specifically sections 401 (Certification) and 404 (Permits for Dredged or Fill Material). These two sections are briefly discussed in Appendix B (see the discussion on the Clean Water Act under "Federal Regulations"). A section 404(b)(1) Evaluation will be prepared for the project as part of the Draft EIS/R.

Regulatory Setting for Placement at LA-2

The following information on the regulatory setting of LA-2 is from the EPA (personal communication, Alan Ota 1994). EPA has the authority to designate permanent ocean placement sites under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA). EPA formally designated the LA-2 site for this purpose in early 1991. The Corps has authority under Section 103 of the MPRSA to issue a permit for a proposed project to use a specific disposal site, regardless of whether the site has been formally designated as a disposal site by the EPA. The EPA reviews Corps permits for ocean disposal from specific projects and has authority to veto a permit.

Even though the LA-2 site is outside state waters (i.e., more than 3 miles offshore) and thus outside the coastal zone, ocean disposal activities can potentially affect the coastal zone. For example, vessels transporting the dredged sediment to the site must traverse coastal waters, and the disposed sediment could be transported back to the coastal zone. The California Coastal Commission (CCC) thus has review authority over this site's use. When the site was initially designated in 1991, the CCC granted a consistency determination that was to last for the first 5 years of the site's use. This consistency determination included an agreement that EPA would conduct additional monitoring at the site and would submit the results to the CCC for review. EPA is currently in the process of obtaining recertification of this site from the CCC. This recertification process has involved EPA preparing a report on the monitoring results, and the CCC staff are currently reviewing EPA's preliminary administrative staff report. After this report is finalized sometime in 1995, the Coastal Commission will hold a hearing on the recertification issue. It is possible that the Commission could determine at that time that recertification of LA-2 would be necessary again at some specified future time. The 1992 amendments to the federal Water Resources Development Act stipulate that all ocean disposal sites must be permanently designated by 1997 (personal communication, Alan Ota 1994).

Regulatory Setting for Crude Oil Storage Tanks

Construction and operation of the crude oil storage tanks would be subject to the requirements of any necessary permits for the tanks (e.g., from city planning or building departments, the RWQCB, the SCAQMD etc.).

Regulatory Setting for Executive Order 12898 on Environmental Justice

A Presidential Memorandum and this Executive Order, entitled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, were signed by President Clinton on February 11, 1994. The Executive Order (EO) requires that, "To the greatest extent practicable ... each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disaproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations ..." The Presidential Memorandum further requires that each federal agency ensure that opportunities are presented for affected communities to provide input into the NEPA process, including identification of mitigation measures.

Consideration of this Executive Order in NEPA documentation ensures that two questions are asked: (1) Is a federal project with significant adverse environmental impacts being proposed in a community that is comprised largely of minority or low-income persons? and (2) Would any significant adverse human health or environmental effects of the project disproportionately affect minority or low-income persons?

The significant impacts on people from the proposed project are impacts on air quality. There will be significant, unmitigable short term impacts on air quality (see Section 4.4). Because the pollutant emissions that will cause this impact will be spread over a large portion of the region, minority or low-income communities will not be disproportionately affected. While short term adverse impacts will occur during project construction, overall impact will be less, or beneficial. Therefore, this EO on Environmental Justice is not an issue.

Regarding the EO's requirement to ensure that potentially affected minority or low-income communities have opportunities to provide input into the NEPA process, a list of meetings with the locals is provided in Section 13.

EO 12898 provides for an Environmental Justice Working Group with a 24-month environmental justice strategy development schedule. But the Presidential Memorandum accompanying the EO directs each federal agency to begin implementing specific directives immediately. One of the directives requires federal agencies to mitigate significant and adverse environmental effects of proposed federal actions on minority and low-income populations. The Corps has determined that the proposed project alternatives will not significantly affect minority or low-income populations, and mitigation is not required.

4.9 GROUND TRANSPORTATION

The following section describes the existing conditions of the roadway network that serves the POLB. Roadway conditions at other locations in the project area would be unaffected by the project, so they are not discussed.

4.9.1 Affected Environment

Regional access to the harbor area is provided by a network of freeway and arterial facilities, as shown on Figure 4.9-1. The freeways include the Harbor Freeway (I-110), the Long Beach Freeway (I-710), the San Diego Freeway (I-405), and the Terminal Island Freeway (SR 47), while the arterial street network includes Henry Ford Avenue, Alameda Street, Anaheim Street, and Pacific Coast Highway (State Route 1).

Nine major thoroughfare intersections accommodate traffic entering and exiting the POLB. In rating the operating condition of a roadway segment with existing or future traffic volumes, "Level of Service" (LOS) grades "A" through "F" are assigned, with LOS A indicating very good operation (i.e., very good traffic flow) and LOS F indicating poor operation. According to recent traffic counts (POLB 1994a), all intersections except two are operating at acceptable levels (LOS C or better). The Santa Fe Avenue/Pacific Coast Highway and Harbor Scenic Drive-Harbor Plaza/I-710 southbound offramp operate at LOS E during the P.M. peak-hour indicating extreme congestion and delay.

4.9.2 Impact Significance Criteria

The impact methodology described below has been used to estimate potential adverse or significant traffic circulation and intersection capacity impacts associated with the proposed project. A deterioration in peak-hour traffic beyond LOS D is considered a significant impact.

4.9.3 Construction Impacts

4.9.3.1 The Dredge Area

The dredge and support equipment would most likely be transported to the site by water, resulting in no impact on ground transportation. The insignificant impact of project-related employees commuting to the staging area during construction is discussed in section 4.9.3.3.

4.9.3.2 Placement Options

Land-based traffic associated with construction-employee commuting would be the same as discussed above for the dredge area. Since material placement operations would occur over water, there would be no additional ground transportation traffic beyond the employee commuting described above.

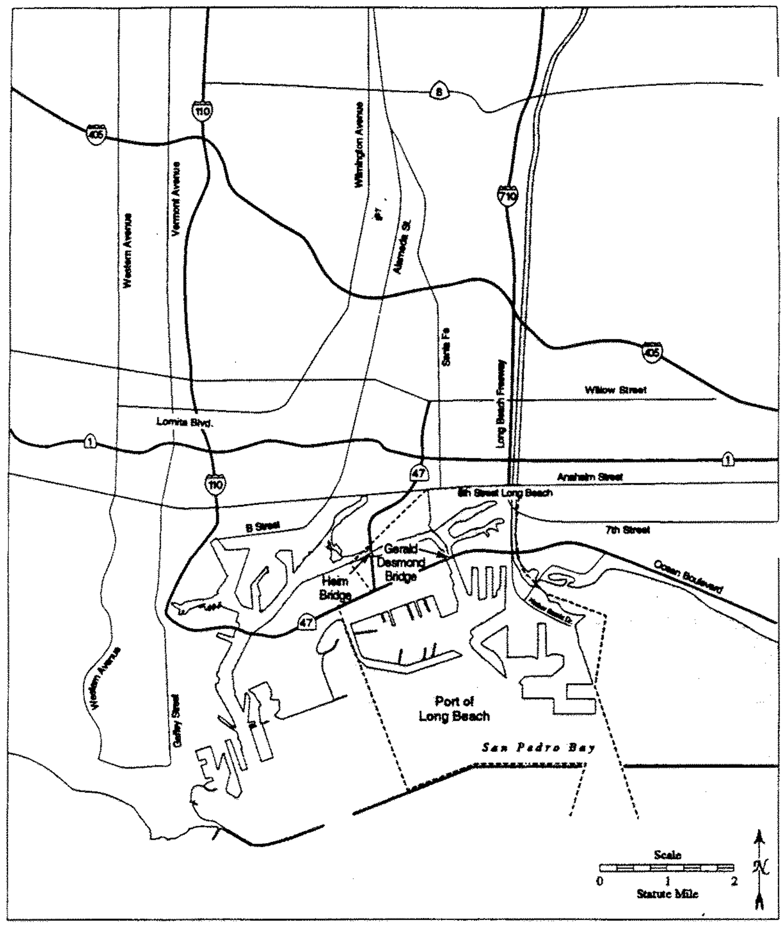


Figure 4.9-1. Regional Transportation Network

4.9.3.3 Ancillary Facilities

Project construction would require approximately 20 employees during the 16- to 22-month dredging period. These commuting employees would generate 20 daily peak A.M. and P.M. trips (PHT) to the staging area. Some of these workers could live aboard the hopper dredge, reducing the number of vehicle trips (personal communication, Jane Grandon 1995). The addition of a maximum 20 PHT would be distributed over the transportation network in the POLB vicinity. These contributions to traffic volumes would be minute relative to the number of vehicles currently accessing these areas. No degradation of intersection level of service would occur. Therefore, project impacts on ground transportation would be insignificant.

Construction of additional crude oil storage tanks would occur over a 12- to 15-month period, including 3 to 4 months for site preparation and 8 to 12 months for installation of tanks. During site preparation, heavy equipment would remain onsite; associated traffic would be very low. There would also be few project-related employee trips. These employee trips would continue during tank installation. Traffic impacts would therefore be very low, short term, and insignificant. No additional traffic would be associated with use of the staging area. Potential short-term impacts on available parking in the area, due to the conversion of the existing parking lot to the storage tank site, is discussed in section 4.8.3.3.

4.9.4 Long-Term Impacts

The additional cargo that fully loaded tankers could bring into the POLB once the approach channel is deepened would be transported out of the POLB via pipeline, resulting in no additional truck trips. Long-term ground transportation would not increase as a result, so there would be no long-term impacts.

Potential long-term impacts on available parking in the area, due to the conversion of the existing parking lot to the storage tank site, is discussed in section 4.8.4.

4.10 VESSEL TRANSPORTATION AND SAFETY

4.10.1 Affected Environment

Commercial shipping vessels enter the POLB through the Queen's Gate, following vessel traffic lanes established by the U.S. Coast Guard (USCG) (COE and LAHD 1992) (Figure 4.10-1). These traffic lanes meet in the Precautionary Area immediately outside the harbor, where incoming, outgoing, and cross-traffic converge. To prevent conflicts, only vessels that are planning to anchor, enter, or leave the ports are allowed in the Precautionary Area (COE and LAHD 1992).

From June 1991 to June 1992, 3,239 vessels arrived at the POLB (Table 4.10-1), of which 539 (17 percent) were transporting liquid bulk (POLB 1992). Once within the harbor, 25 percent of these arrivals move between berths and/or anchorages (COE and LAHD 1992). As a result, approximately 7,288 vessel movements (3,239 arrivals x 2.25 movements) occurred inside the POLB breakwaters during this timeframe.

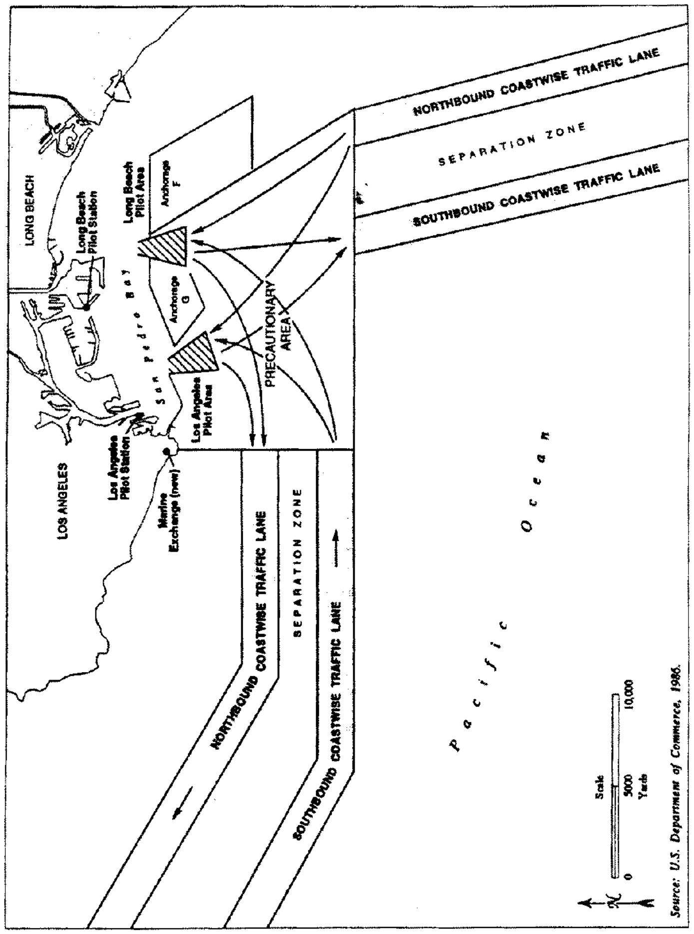
Table 4.10-1. Vessel Arrivals by Type at the Ports of Los Angeles and Long Beach for FY1992

	Number of Arrivals		
Vessel Type	*POLA*	*POLB*	*Total*
Container	1,090	929	2,019
General cargo	322	449	771
Automobile	286	91	377
Dry bulk	52	192	244
Liquid bulk	565	539	1,104
Passenger	416	0	416
Bunkers, repair, stores	137	1,039	1,176
TOTAL	2,868	3,239	6,107

Source: POLA and POLB records 1992.

Some vessels use one of the six anchorages for a short time while calling inside the Port (Figure 4.10-2) to bunker (refuel), to wait for a dock, or to wait for orders or minor repairs (COE and LAHD 1992). The anchorages within the breakwater are used by vessels for fairly short periods of time; 50 percent remain less than 10 hours and 90 percent for less than 36 hours. The anchorages outside the breakwater are rarely used extensively as they are unprotected. Bunkering and off-loading of liquid and bulk cargo (lightering) are prohibited outside the breakwater.

Management of vessel traffic within the harbor and approaches to the POLB is controlled by two groups: the Marine Exchange of Los Angeles/Long Beach Harbor (Marine Exchange) and Jacobsen Pilot Service (JPS). Since the early 1980s, the Marine Exchange has provided marine traffic advisories to vessels entering and exiting the harbor (personal communication, Captain Dick McKenna 1995), while JPS serves as the control point for vessel traffic entering the POLB, and provides a traffic check for every vessel entering the harbor (personal communication, Dick Jacobsen 1995). These facilities ensure coordination among visiting vessels and their ports of call.



Source: U.S. Department of Commerce, 1986.

Figure 4.10-1. Port Access Routes

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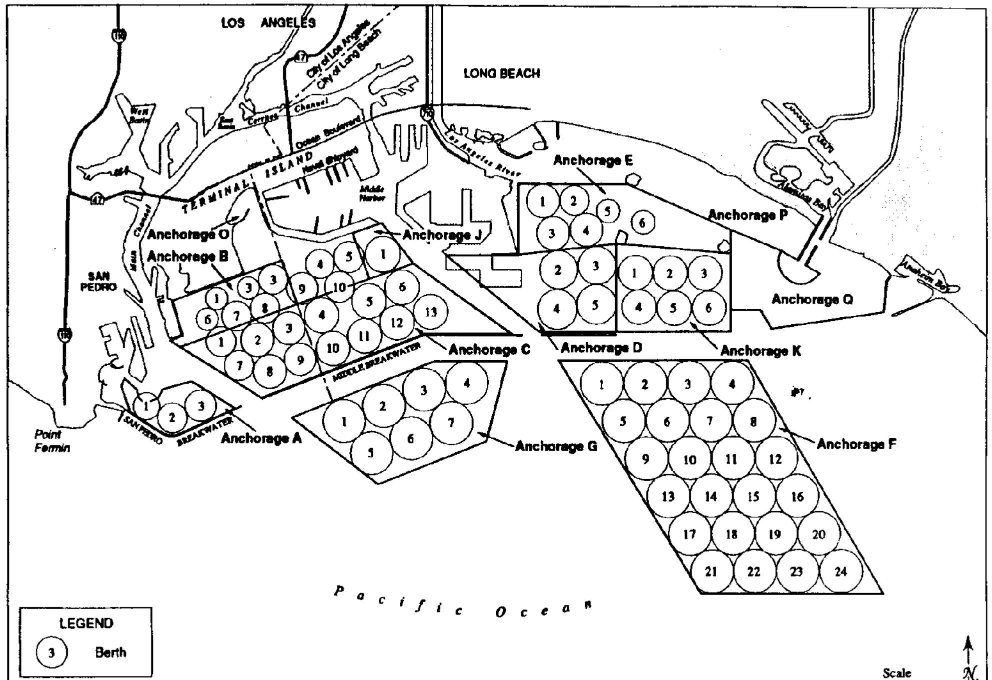

Note: Anchorages O, P, and Q are shallow-draft anchorages.
Source: U. S. Department of Commerce, 1986.

Figure 4.10-2. Ports of Los Angeles and Long Beach Anchorages

The U.S. Coast Guard maintains project vicinity vessel accident data. Recreational boating is responsible for nearly all accidents within the Long Beach Outer Harbor. Incidents increase dramatically during the summer season. Recreational activity is centered east of the proposed dredging area near Shoreline Village, Alamitos Bay, and Anaheim Bay (personal communication, Randy Reid 1995).

Neither the Marine Exchange nor JPS keeps official records of vessel incidents. JPS pilots have over 75 years of experience, however, and state that the number of accidents during this period of time was very small (personal communication, Dick Jacobsen 1995). Since the introduction of radar for controlling traffic, vessel incidents have been virtually eliminated.

Currently, the POLB requires all dredging project contractors to attend a coordination session with the JPS in which harbor safety operating procedures and protocol are addressed. When necessary, the contractors are responsible for placement of warning buoys located at a safe distance from dredging activity to provide notice to other vessel traffic, particularly recreational boaters (personal communication, Dick Jacobsen 1995). By coordinating construction vessel activity within the harbor, barge excavation projects have not historically resulted in increased vessel safety hazards (personal communication, Dick Jacobsen, 1995).

Barge traffic is common within the POLB area. Dredging projects and importation of Santa Catalina Island quarry rock for revetment often result in six barges daily, with three per day a normal occurrence (personal communication, Captain Dick McKenna 1995). Barge traffic outside the harbor travelling to the LA-2 site is regulated by the vessel traffic information service (VTIS) under the authority of the state and manned by the U.S. Coast Guard.

4.10.2 Impact Significance Criteria

A significant impact on marine vessel transportation would occur if an increase in traffic were to result in congestion within the harbor, and/or if the capacity for maritime commerce to operate efficiently and safely were to be exceeded.

4.10.3 Construction Impacts

4.10.3.1 The Dredge Area

During construction, channel dredging would occur over an approximate 16- to 22-month period. The hopper dredge could make seven to eight trips per day from the dredge site to a placement site, depending on the placement site's location (slightly fewer daily trips to the farther LA-2 site). This number of dredge trips does not represent a substantial increase in volume, given the number of vessels typically active in the harbor. The dredging is not expected to require the closure of any navigation channels. The dredging contractor would participate in an orientation session with JPS prior to construction, ensuring coordination with existing vessel traffic in the project area, including vessel traffic into and out of the Long Beach Naval Shipyard which also uses the Queen's Gate opening in the breakwater. Due to the limited duration of this activity and Port-required coordination with the Long Beach Pilot Station, construction impacts on vessel transportation are expected to be insignificant.

4.10.3.2 Placement Options

During construction, the project would generate a maximum of seven to eight hopper dredge trips per day traveling from the Queen's Gate to one or more placement sites. This number is not a substantial increase given the number of vessels typically active inside and outside Queen's Gate. The VTIS oversight of vessel traffic to the LA-2 site would decrease potential vessel conflicts along this transportation route. Impacts during construction would be insignificant.

4.10.3.3 Ancillary Facilities

Construction of on-land additional crude oil storage tanks would not affect marine vessel transportation. No impacts would result. Use of the staging area on the Mole Pier could add a few vessel trips per day in this area if supply boats shuttle supplies to and from the hopper dredge. These few additional vessel trips would not be a significant impact.

4.10.4 Long-Term Impacts

Projections for the year 2010 indicate that the proposed project would eliminate 28 annual tanker trips to Berth T121 compared to existing (1994) conditions (see Table 3-4). This would decrease the existing (1994) annual average of 80 trips to 52 trips. The size of vessels would increase, but this would not increase the potential for transportation incidents. The reduced traffic would be a beneficial impact on vessel safety. No navigational problems are anticipated as a result of the decreased vessel activity.

4.11 AESTHETICS

4.11.1 Affected Environment

Visual resources consist of the natural and man-made features that give a particular environment its aesthetic qualities. Visual character is evaluated to assess whether a proposed project would be compatible with the existing setting or would contrast noticeably with the setting and appear out of place. The region of influence for aesthetics includes the sensitive viewpoints from which the dredge, placement sites, or ancillary facilities can be viewed. Sensitive viewpoints in the project vicinity include recreational and residential areas.

4.11.1.1 The Dredge Area

The POLB is a highly industrialized area with a concentration of shipping, oil production, and other Port activities, although recreational activities are found in the Queensway Bay District. Several sensitive views of the Port have been identified but, with the exception of the all-encompassing view of the Port from downtown Long Beach, none of these sensitive views is in the project area.

The dredge site would be located in a shipping channel in the POLB. The visual character of this area is varied and ranges from the open waters of San Pedro Bay to industrial development on Pier J and Pier F. The project site could be visible from a portion of the public fishing access available on the eastern side of Pier J, but this area is not considered particularly sensitive since it primarily consists of industrial development. The dredge site is approximately 14,000 feet (2.7 miles) from any residential or recreational areas that would be considered sensitive viewpoints.

4.11.1.2 Placement Options

Landfill in the Port of Los Angeles

The closest visually sensitive land use is 18 units of Bureau of Prisons employee housing located at the Federal Correctional Facility Terminal Island, on the southeast corner of Reservation Point approximately 1,000 feet west of the proposed channel placement area. Other areas in the vicinity, including Pier 300, the remainder of Reservation Point, and areas bordering Fish Harbor generally contain marine-related industrial, commercial, or military uses that are not visually sensitive.

Borrow Pits

Main Channel Borrow Pit

Gull Park, operated by the U.S. Navy, and located at the east end of the Naval Station Mole was evaluated to determine its visual sensitivity. The park is located less than 500 feet northwest of the Main Channel Borrow pit. It contains two baseball fields, picnic tables, and restrooms. Previously used primarily by sailors stationed at U.S. Naval Station Long Beach, the park is not open to the public and gets limited use due to closure of the Naval Station. The Navy plans to lease this area, possibly to the Port of Long Beach, and it's continued use is uncertain (personal communication, S. Hall 1995). Because of limited existing use by the Navy and lack of public access, Gull Park was not considered to be a visually sensitive use.

Energy Island Borrow Pits

The two Energy Island borrow pits are located offshore and in open water. The north borrow pit is the closest to shore of the two, approximately 1,000 feet from Long Beach City Beach at its closest point. The southeast borrow pit is approximately 3,000 feet from the beach. In 1987, annual visitation at Long Beach City Beach was approximately 10 million people, with highest use occurring during summer months and on weekends (COE and POLA 1992). Aside from possibly some recreational fishing in the general area, these pits are not likely to have other uses. Island White, one of the four Energy Islands created when four borrow pits were dug in the 1960s, is located between the north and southeast pits. Facilities on Island White and the other Energy Islands are associated with oil production and are operated by THUMS Long Beach for the City of Long Beach.

Long Beach City Beach is considered to be the only sensitive (recreation-related) viewpoint associated with the two Energy Island placement sites.

LA-2

This site is located 8.7 miles from the center of the dredge area. It is therefore surrounded by open water and is not visible from any sensitive viewpoints.

4.11.2 Impact Significance Criteria

Significant aesthetic impacts would occur if project features or related activities substantially and adversely alter or conflict with the visual qualities of designated scenic areas or corridors, other designated visual resources, or views from visually sensitive viewing areas such as recreation and open space areas, residential areas, historic districts, and similar areas.

4.11.3 Construction Impacts

4.11.3.1 The Dredge Area

The main channel containing the dredge site is a shipping channel with primarily industrial activity. Since the closest sensitive receptors are approximately 14,000 feet from the dredge site, no aesthetic impacts are anticipated.

4.11.3.2 Placement Options

Landfill in the Port of Los Angeles

Impacts from transportation of dredged material to the landfill site were evaluated for the 18 units of Bureau of Prisons employee housing located on the southeast corner of Reservation Point. The visual impacts of the hopper and pipeline dredges are considered to be short term and adverse but not significant.

Borrow Pits

Main Channel Borrow Pit

Because of limited existing use by the Navy and lack of public access, Gull Park, located less than 500 feet northwest of the Main Channel borrow pit, was not considered to be a visually sensitive use. Visual impacts from use of the Main Channel borrow pit are considered to be negligible due to the lack of visually sensitive areas in the vicinity.

Energy Island Borrow Pits

The nearest visually sensitive area is Long Beach City Beach located approximately 1,000 feet north of the Energy Island north borrow pit, at the closest point. Placement of dredged material at this site would occur approximately seven times per day (about once every 3 to 4 hours over a 24-hour period), for about 470 days. A beach-goer spending 6 hours on the beach would, on average, be exposed to only two hopper dredges. The Energy Island southeast borrow pit is approximately 3,000 feet from the beach and the hopper dredge would be less visible than from the north pit, but would make seven trips per day over about 126 days, and could be visible within the same views. Aesthetic impacts are considered to be short term and adverse, but not significant.

LA-2

No visually sensitive areas are located in the vicinity of LA-2, so no aesthetic impacts would occur.

4.11.3.3 Ancillary Facilities

Crude Oil Storage Tanks

Though the site itself, an existing parking lot, is adjacent to industrialized uses (refineries, storage tanks, and a crude terminal), it is possible that visually sensitive uses such as residences, parks, or other similar areas exist in the viewshed of the storage tank site within the Cities of Carson and Los Angeles. While any temporary visual impacts during construction would not be expected to be significant, the identification and evaluation of visually sensitive uses in this area would be included in project-specific environmental document for these tanks.

Staging Area

No visually sensitive uses are located in the vicinity of the proposed staging area located on the Naval Station Mole. Visual impacts would be negligible.

4.11.4 Long-Term Impacts

The only project element that would be visible over the long term would be the crude oil storage tanks. The addition of these tanks is not expected to significantly change the overall industrial character of that area, so the long-term aesthetic impact is expected to be insignificant. However, the project-specific environmental document prepared for the tanks prior to their construction would evaluate this impact in more detail.

5.0 IMPACTS OF THE NO-ACTION ALTERNATIVE

For most of the resources addressed in this document, there would be no impacts associated with the no-action alternative, which is described in section 3.3.2. The following section discusses only the resources for which there would be an adverse or beneficial impact associated with the no-action alternative.

Oceanography and Water Quality

Under the no-action alternative, water quality in Long Beach Harbor and in the Pacific Ocean near Queen's Gate would remain essentially as at present. Turbidity impacts at the dredging and placement sites would be avoided.

Marine Resources

Under the no-action alternative, impacts of dredging and placement of the materials on benthic infauna, fish, seabirds, and plankton would be avoided, so biologically productive areas would continue to be productive. The borrow pits would continue to act as flocculent sediment traps, supporting a degraded benthic community. The beneficial effects of filling the borrow pits with cleaner sediments would not occur, and the beneficial effect of converting the habitat at the Energy Island pits to shallower water would also be precluded.

Air Quality

Under the no-action alternative, the deepening project would not be implemented and the emissions associated with the project construction would not occur. The existing, shallow approach channel would continue to force the larger ships to wait for favorable tides before entering the Port or to enter the Port partially loaded. This queuing and partial loading of cargo ships result in inefficiencies in cargo movement. These inefficiencies would result in higher emissions per unit of cargo throughput now and in the future. Similarly, without the project, the long-term beneficial impact on air quality from the reduced number of vessel calls required to carry the same amount of cargo (see section 4.4) would not be realized, and progress toward attainment of the federal and state ambient air quality standards would be hindered.

Socioeconomics

Under the no-action alternative, more vessels would be necessary to carry the same amount of cargo if the dredging did not occur; thus the project benefit of fewer ships carrying the same amount of cargo would not occur. Approximately 20 short-term (up to 22 months) construction jobs and related purchases of construction materials and services would also be lost. The annual net benefit of $29.5 million in transportation cost savings, a long-term beneficial impact, would not be realized.

Vessel Transportation

Under the no-action alternative, the larger tankers would not be able to enter and exit the Port fully loaded. Fewer vessel calls by the larger tankers, that would be possible after the proposed deepening, would thus not be realized. Improvements in vessel safety associated with a deeper approach channel (e.g., fewer vessels needing to wait outside the Port for high tides) would also not occur.

6.0 RECOMMENDATIONS

6.1 THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The determination of the environmentally preferred alternative is based on a comparison of the environmental impacts on each resource that could be expected at the dredge site and each potential placement site. These impacts are described in detail in Chapter 4. For most of the resources, the impacts would be comparable regardless of the placement site selected. The only significant unavoidable impact would be a short-term impact on air quality during construction and would occur regardless of the placement option selected. All other resources addressed in this document would experience either adverse but insignificant impacts or no impact during construction. The project would result in several beneficial impacts (see below), and there would be no long-term unavoidable significant impacts.

The air quality impact is an exceedance of the significance thresholds for emissions of oxides of nitrogen (NO_x) and reactive organic compounds (ROC), established by the South Coast Air Quality Management District. These emissions would come from the dredge and associated support equipment during construction. Even with the proposed mitigation measures, these emissions would be above the designated significance thresholds. However, the temporary increase in emissions during construction would be offset by a long-term reduction in emissions from the larger tankers calling on the Port after the approach channel is deepened: fewer vessels more fully loaded would be necessary to transport the same amount of cargo. After the approach channel is deepened, long-term NO_x emissions from tankers would be reduced by 19.9 tons per year from existing (1994) levels and by 15.1 tons per year compared to the no-action alternative in the year 2010. Similarly, long-term ROC emissions from tankers would be reduced by 1.2 tons per year from existing (1994) levels and by 0.9 tons per year compared to the no-action alternative in the year 2010. Emissions of other pollutants, which would not exceed significance thresholds, would also be reduced over the long term.

The project would result in several beneficial impacts. Filling any of the borrow pits would have a beneficial effect on bottom topography. Filling the Energy Island pits could improve the local ecology because a shallower water habitat is generally more productive than deeper waters (see, for example, the U.S. Fish and Wildlife Service's Planning Aid Letter in Appendix E, as well as the DDNI EIS/R [COE and LAHD 1992]). It would also increase the amount of habitat suitable for California halibut spawning. The deeper channels would result in a long-term beneficial impact on vessel transportation by allowing the larger tankers to enter and exit the Port fully loaded, reducing delays due to tides and requiring fewer vessel calls to transport the same amount of cargo. This would also increase vessel safety. The project would provide jobs to approximately 20 people during the 16- to 22-month construction period; the available labor pool in the region could easily supply this workforce. Additional economic benefits would result from the purchase of construction materials and other related services. After the approach channel is deepened, the increased efficiency in the Port's handling of tanker vessel traffic and associated cargo could have a long-term beneficial effect on local port-related employment and revenues. After the channel is deepened, there would be a $29.5 million annual savings in transportation costs.

Of the five placement options, the POLA Pier 400 landfill and the three borrow pit sites would be preferred over LA-2, primarily because they are closer to the dredge site. These four sites in San Pedro Bay also represent a beneficial re-use of the material either now or potentially in the future. Placement in the Pier 400 landfill would be a present beneficial use. Use of any of the borrow pits could allow the material to be re-used for a beneficial purpose at some time in the future. Of these four sites in San

Pedro Bay, the Pier 400 landfill would be preferred to the borrow pits. Among the three borrow pit sites, that in the Main Channel would be preferred to the two Energy Island pits. Of the two Energy Island pits, the southeast pit would be preferred to the north pit. The reasoning for this ranking of the placement sites is explained below.

Use of the POLA Pier 400 landfill has the advantage that it is already a permitted landfill. Also, since the dredged material would not impact a new area (it would be placed in the existing "footprint" established as part of the DDNI project), the only impacts attributable to the proposed project would be those due to transporting the material there. And, as noted above, selection of this site would allow a beneficial re-use of the material and would reduce the amount of "virgin" material the POLA must dredge to complete Pier 400.

Of the three borrow pit sites, the Main Channel borrow pit would be preferred. Filling this pit from its existing depth of 90 feet below MLLW to the surrounding depth of 76 feet below MLLW would increase circulation and dissolved oxygen in the area and could possibly increase bio-productivity. Filling this pit would return this portion of the channel to its optimum depth and would eliminate the potential for slumping of sediments in this area; this would increase the navigation channel's stability. This site is the closest to the dredge area; compared to the other sites, there would thus be less emissions from transporting the material there. Compared to the Energy Island borrow pits, this site is also far from more productive shallow water habitats, and thus less likely to cause turbidity impacts to foraging areas.

Of the two Energy Island borrow pits, the southeast pit would be preferred over the north pit. The southeast borrow pit is about 500 feet farther from a shallow water foraging area than the north borrow pit, so the potential for turbidity impacts on this foraging area would be slightly lower. Also, the EPA and other agencies have informally requested that the north pit be reserved for a possible future confined disposal site (i.e., a capping program).

LA-2's substantially further distance from the dredge site (it is over twice as far [8.7 miles] as the farthest site in San Pedro Bay [POLA Pier 400 at 4.2 miles]) would result in higher emissions from transporting the material to this site. For example, if the LA-2 site were used instead of a combination of sites that included the POLA Pier 400, Main Channel borrow pit, and Energy Island southeast pit, there would be approximately 40 percent higher total NO_x emissions (329.2 tons vs. 235.4 tons) and 44 percent higher total ROC emissions (31.0 tons vs. 21.5 tons). (While there would also be higher transportation costs for the LA-2 site, cost is not a factor in determining the environmentally preferred alternative; it is a factor in determining the national economic development [NED] plan discussed below.) Because of this site's depth, placing the material here would preclude any future beneficial re-use of the sediment.

Since only two of the five potential sites (Energy Island north pit and LA-2) could hold the total sediment volume (5.6 mcy), the other three sites (POLA Pier 400, Main Channel pit, and Energy Island southeast pit) would have to be used in some combination to accommodate all of the dredged material. Several alternatives are possible. Alternative placement scenarios were formulated by assigning the maximum sediment volume to the highest ranked site, then filling the next best site, and so on, until 5.6 mcy of capacity was used. Based on this strategy, the following three alternative placement scenarios were formulated, in addition to the no-action alternative. The sediment volumes noted below are the best estimates at this time.

The recommended (or preferred) plan (Alternative A) was formulated based on the most beneficial re-use of the material:

Alternative A:	POLA Pier 400	2.0 mcy
	Main Channel Pit	2.1 mcy
	Energy Island Southeast Pit	1.5 mcy
		5.6 mcy

The secondary plan (Alternative B) was formulated as an option in the event that placement in Pier 400 becomes infeasible in the future due to unforeseen technical or schedule problems:

Alternative B:	Main Channel Pit	2.1 mcy
	Energy Island Southeast Pit	1.5 mcy
	Energy Island North Pit	2.0 mcy
		5.6 mcy

The tertiary plan (Alternative C) was formulated as an option in the event that placement in the pits becomes infeasible in the future.

Alternative C:	LA-2	5.6 mcy

While the no-action alternative would have less impacts on most resources than any of the above alternatives, it would not achieve the project objective, nor would the substantial beneficial long-term impacts on air quality, reduced transportation costs, and improved vessel safety be realized.

The timing of dredging or the material placement location for the environmentally preferred alternative could be affected by the seasonal activity of certain sensitive biological resources, such as the California least tern and California brown pelican, that could be present near either the dredge site or borrow pit placement areas. Least terns nest from approximately April through August and, although unlikely, could forage over some of the borrow pits during the first 2 months of this period (April and May). Brown pelicans often rest on the breakwaters adjacent to Queen's Gate, and are most abundant from early July to early November. Since the only potential impacts to pelicans would be disturbing them from resting on the breakwater right at Queen's Gate during dredging, and they can easily rest elsewhere along the breakwater, rescheduling dredging to avoid them is not warranted. The sensitive biological period would then be April and May, the beginning of the least tern nesting period.

If the material is placed only at sites in San Pedro Bay (Alternative A or B above), construction could be completed within approximately 18 months. If construction is to proceed uninterrupted during this 18-month period, the environmentally preferred alternative would entail beginning construction as early as June (when least terns would not be foraging in the borrow pit areas) or as late as late August (if waiting until the end of the least tern nesting season) of the first year (1997), continuing through the entire second year (1998), and completing construction in January or March of the third year (1999). With this timing, only one least tern nesting season (April through August) would occur during the 18-month construction period. During this one nesting season that would coincide with construction, sediment could be placed at the POLA Pier 400 site, the Main Channel borrow pit, or in the deepest portions of the Energy Island borrow pits to minimize potential impacts on least terns foraging.

It may not be possible to begin construction under the optimal timing scenario described above (i.e., in the June to August timeframe). In such an event, it would still be possible to minimize any potential impacts on least tern foraging. The strategy in this case would entail avoiding use of the Energy Island pits during the least tern season, using other placement sites during that period, then returning to these pits during a time of the year when the least terns are not a concern. Under Alternative A, since the top layer of dredge sediment would go to POLA Pier 400, that site would be used first. Once placement is completed at that site, sediment could then go to either the Main Channel pit or the Energy Island southeast pit if the least terns are not a concern at that time of the year. If least terns are a concern at that time in the dredging schedule, sediment would go then to the Main Channel pit, and placement would occur last at the Energy Island southeast pit. Alternative B could avoid the least tern season by using the Main Channel pit during the least tern season, and using both of the Energy Island pits at other times of the dredging schedule. The least tern is not a concern under Alternative C.

6.2 THE NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN

The NED Plan includes deepening the channel to -76 feet MLLW, continued use of tides, and placement of the material at the same sites as the environmentally preferred plan, namely POLA Pier 400 landfill, the Main Channel borrow pit, and the Energy Island southeast borrow pit.

6.3 THE RECOMMENDED PLAN

The recommended plan is the same as the NED Plan.

7.0 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF ALTERNATIVES AND MITIGATION MEASURES

Regardless of which alternative placement sites are selected, the proposed project would require the consumption of additional energy during construction. The additional energy requirements would be the diesel fuel for the dredge and support equipment. Since the project does not require that labor be imported to the region, project-related employees during construction would likely be commuting to other jobs in the vicinity even without the proposed project. Thus the fuel consumed during their commute would occur even without the project. The increased energy usage associated with the project would be negligible when compared to the total amount of energy used in the vicinity of the Port of Long Beach. The design phase of the project has incorporated economically feasible, energy-saving conservation measures for construction-related activities, where feasible.

After construction, the reduced number of tanker calls to Berth T121 that would be necessary to transport the same amount of cargo would result in a long-term reduction in the amount of energy consumed for the transportation of crude oil.

8.0 UNAVOIDABLE SIGNIFICANT IMPACTS

Dredging and placement operations would result in unavoidable significant impacts on air quality because emissions of both oxides of nitrogen (NO_x) and reactive organic compounds (ROC) would exceed significance thresholds established by the South Coast Air Quality Management District, and feasible mitigation measures would not reduce these emissions below the thresholds. This would be true for all the potential placement options. The main source of emissions would be the diesel-powered dredge. However, these emissions would be temporary, would cease at the end of the 16- to 22-month construction period, and they would be offset by the long-term air quality benefit that would result from fewer tanker trips to Berth T121 after the channel is deepened.

Aside from the increased emissions associated with the project during construction, there would be no other unavoidable significant impacts on any of the other environmental resources addressed in this EIS/R.

9.0 GROWTH-INDUCING IMPACTS

Growth-inducing effects are those characteristics of a project that tend to foster or influence direct and indirect growth in the vicinity, or that create significant new demands for supporting services and activities.

During construction, the project would require only 20 employees; such a relatively small workforce in the very large labor force available in the greater Los Angeles area would not induce an influx of employees into the area. The workforce required for the project would thus not be growth-inducing. Since the project is a dredging/placement project, relatively few construction-related materials would be required, and they would be able to be procured from existing manufacturers, vendors, and other suppliers. Based on these considerations, construction of the project would not induce growth.

Once the approach channel is deepened, supertankers would be able to enter and exit the Port fully loaded. This would result in more efficient vessel and cargo operations, so that fewer vessel calls would be necessary to transport the same amount of cargo. Consequently, the proposed deepening would not cause an increase in vessel calls at the Port. Future cargo projections are the same for both the no-project alternative and the with-project condition (i.e., after the deepening), so the project would not induce additional cargo throughput. While the proposed deepening does induce the need for new crude oil storage tanks as described in Chapter 3, crude oil throughput cannot increase because the ARCO Watson Refinery, where this oil would be refined, cannot increase its processing capacity due to existing air quality constraints.

Should the deeper approach channel result in growth in other maritime trade that necessitates expansion or construction of major new facilities or infrastructure improvements beyond the currently planned capacity, additional environmental review would be required.

10.0 CUMULATIVE IMPACTS

10.1 DESCRIPTION OF CUMULATIVE PROJECTS

Potential cumulative impacts of the proposed deepening of the entrance channel to the POLB involve both regional and local considerations. Within the regional context, the proposed project would be part of the ongoing dredging and disposal activities required for the maintenance and improvement of commercial ports, public and private marinas, and flood control facilities in the vicinity of the POLB and POLA. In a local context, the proposed project would be one of a number of projects that the POLB is planning or carrying out within its jurisdictional boundaries in order to remain a competitive West Coast port. Related projects anticipated by the POLB, and POLA projects adjacent to POLB, are summarized in Table 10.1-1 and shown in Figure 10.1-1 (project #5 in the table is not shown in the figure because its various locations have not been identified yet). Note that although the proposed construction timeframe for several of the projects in the table indicates these projects would be completed in 1996, before the proposed deepening begins in 1997, they are nevertheless included in the qualitative analysis below because construction timeframes may vary.

10.2 CUMULATIVE IMPACT ASSESSMENT

10.2.1 Topography and Geology

Other projects within the vicinity of the Queen's Gate dredge area are predominantly related to land improvements and circulation improvements within the Harbor area, except for the new breakwater at Pier J Expansion. Impacts that could potentially be considered cumulative would be topographic alterations from dredging or placement of dredged material. Appropriate geotechnical and engineering designs would be implemented to ensure that no topographic impacts occur that would be considered cumulatively significant from these projects.

10.2.2 Oceanography and Water Quality

Concurrent or sequential implementation of the proposed project with any of the 12 other projects planned for Long Beach Harbor would have negligible impacts on oceanographic resources and water quality. The other projects involve construction activities on land that would have minimal effects on harbor waters that could interact with effects of the proposed project. Even if any of the other projects resulted in increased urban runoff from the Port that adversely affected water quality, this would not be a cumulative impact with the proposed project because the proposed project would have no effect on runoff.

10.2.3 Marine Resources

There would be no cumulative impact on marine resources from the proposed project in combination with the other planned developments in the POLB because the other developments would occur on land.

10.2.4 Air Quality

Construction emissions from the Queen's Gate dredging, transport, and placement activities would be spread over a large portion of the Long Beach Harbor and entrance channel. In addition, since project

Table 10.1-1

RELATED PROJECTS IN THE PORT OF LONG BEACH AND PORT OF LOS ANGELES

Number	Location	Project	Project Status	Proposed Construction Timeframe
1	ITS Terminal Modifications	Expand existing International Transportation Service facility on Pier J and add a second on-dock railyard	Approved project	1995-1996
2	PCT Terminal Modification	Expand existing Pacific Container Terminal facility and construct an on-dock railyard	Approved project	1995-1996
3	Pico Avenue Grade Separation	Construct grade separation of train and vehicular traffic	Approved and under construction	1994-1996
4	Pier A Marine Terminal Development	Berths A88-A94 marine terminal development - 160 acre terminal	EIR in progress	1995-1997
5	Various as yet unspecified locations in the Port	Double-Stack Train Plan - two to three intermodal railyards	Anticipated projects	1995-1997
6	Anaheim Street Grade Separation at Southern Pacific Railroad Crossing	Construct grade separation on Anaheim Street	Anticipated project	1995-1996
7	Pico Corridor I-710 Interchange	Construct interchange on Pico Avenue near Pier B Street to provide grade separation for train and vehicular traffic, and to provide access to Pier B, C, and 9th streets, as well as onramps and offramps to Harbor Scenic Drive	Approved project	1994-1996
8	General Desmond Bridge and Harbor Scenic Drive/Ocean Boulevard Connectors	Ports Access Demonstration Projects – improvements to existing roadways	Approved project	1993-1995

Table 10.1-1

RELATED PROJECTS IN THE PORT OF LONG BEACH AND PORT OF LOS ANGELES (cont'd)

Number	Location	Project	Project Status	Proposed Construction Timeframe
9	Pier J Expansion Landfill	Construction of breakwater at Pier J Expansion	Approved project	1995-1997
10	New Dock Street Grade Separation, POLA	Construct grade separation of train and vehicular traffic	Approved project	1995-1997
11	Brighton Beach Railyard, Terminal Island, POLA	Redevelopment of Brighton Beach Railyard, including railtrack connections, an Intermodal Container Transfer Facility, grade separations, and Berths 218-233 expansion	Under review	Unknown
12	Navy Way/Seaside Grade Separation, POLA	Construct grade separation of train and vehicular traffic	Approved project	1995-1997

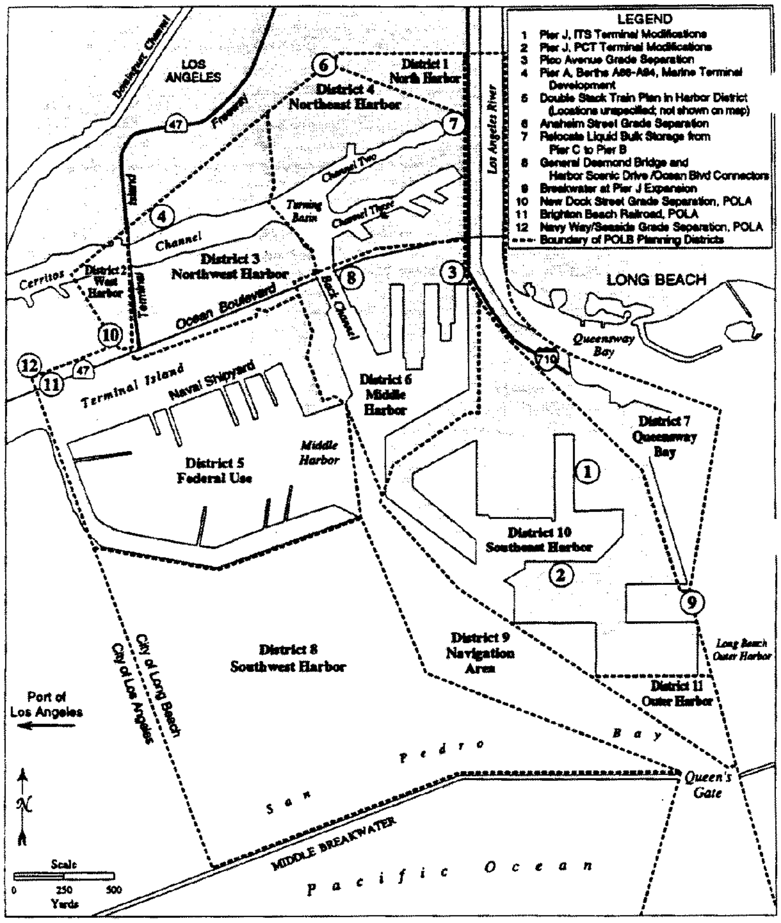

Figure 10.1-1. Related Projects in the Port of Long Beach and Port of Los Angeles

emission sources would be mobile, pollutant impacts would not be large enough nor persistent enough in a localized area to exceed any ambient air quality standard; project construction emissions would, however, exceed SCAQMD significance thresholds for NO_x and ROC. Emissions from the other projects that could occur in the Long Beach Harbor area at the same time as placement at one of the in-harbor sites (i.e., POLA Pier 400 or the borrow pits) could potentially cause impacts to overlap; this could result in exceedance of a state or federal air quality standard. However, this is not expected because either the the related projects are far enough away (greater than one-half mile) from the dredge area and in-harbor placement areas, or they would likely be completed by 1997 when the proposed project would start. These factors would minimize any potential overlap of project emissions, consequently, cumulative air quality impacts would be minimized.

Cumulative impacts after completion of the proposed dredging and placement activities are not expected. Because the project would deepen the Queen's Gate entrance channel, ships that were previously unable to enter the Port fully loaded or that had to wait for favorable tides would be able to enter the channel fully loaded when they arrive at the Port. The elimination of light loading and queuing of ships would reduce the existing inefficiencies in cargo movement. The increased efficiencies would result in lower emissions per unit of cargo throughput in the future.

10.2.5 Noise

The related projects are generally located outside of the potentially affected areas for noise-sensitive land uses identified for this analysis and would not create a cumulative noise impact.

10.2.6 Cultural Resources

Until the identity of the seafloor targets 2, 10, and 17 are verified, the project's contribution to regional cumulative impacts is not known. If targets 2, 10, or 17 are determined to be eligible for the National Register and/or an important archaeological resource under CEQA, direct project impacts will result. Implementation of a treatment plan would minimize cumulative impacts to less than significant. Cumulative project sites are located either on landfill or in previously disturbed areas. Impacts to these related projects are therefore insignificant.

10.2.7 Socioeconomics

To the extent that the related projects increase employment and revenues generated at the POLB, there could be a small beneficial cumulative impact on socioeconomic resources when combined with short-term increases in employment and revenues from the proposed project.

10.2.8 Land and Water Use

All of the related projects except the new breakwater at Pier J Expansion (project #9 in Table and Figure 10.1-1) would change the land side of the POLB. Since the proposed project would not change land uses, there would be no cumulative impact on land use from these other projects. To the extent that water uses around the Port changed in response to the related projects (e.g., additional or different vessel traffic entering and exiting the Port as a result of the new breakwater at Pier J Expansion), there could be some insignificant cumulative impacts on water uses from the proposed project combined with the other projects.

10.2.9 Ground Transportation

The 20 peak-hour trips generated by the project represent less than a 0.01 change in the cumulative volume-to-capacity ratio of affected intersections and do not represent a substantial contribution to increased traffic caused by cumulative projects. The project's contribution to cumulative traffic impacts is therefore considered insignificant. Cumulative impacts on ground transportation were estimated by projecting increased traffic 10 percent per year at two intersections within the POLB, and 5 percent per year at the three intersections outside the Port (POLB 1994a). With increasing traffic, three intersections would operate at less than satisfactory levels at the evening peak hour: Santa Fe Avenue/Pacific Coast Highway (LOS E); Harbor Plaza/Harbor Scenic Drive/I-710/SB off-ramp (LOS F); and Harbor Plaza/Harbor Scenic Drive/I-710 NB on-ramp (LOS D).

10.2.10 Vessel Transportation

The deepened approach channel could allow larger vessels with greater cargo capacities to enter the Port. These larger vessels would not increase safety hazards in the Port and vicinity. The overall number of vessel calls would decline as a result of the project. Implementation of the other cumulative projects would not result in a significant change in tenants or vessel transportation volumes at the Port (personal communication, S. Crouch 1995). For example, the proposed tenant of the marine terminal to be developed at Pier A (project #4) has larger vessels calling at its existing facility within the Port. Relocation to the Pier A facility would not affect vessel sizes. Cumulative development would not result in increased impacts on vessel transportation, and since the project would reduce traffic over existing volumes, its contribution to cumulative impacts is considered beneficial.

10.2.11 Aesthetics

The related projects would add to the industrial appearance of developed lands at the POLB and could result in additional or different vessel traffic. While there could therefore be some short-term cumulative impacts on aesthetics from the proposed project combined with the other projects, since the Port has an industrial character, any changes would be insignificant.

11.0 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES THAT WOULD OCCUR IF THE PROPOSED ACTION WERE IMPLEMENTED

Resources that are committed irreversibly or irretrievably are those that cannot be recovered if the project is implemented.

Irreversible and irretrievable commitments of resources that would result from the proposed project include direct consumption of fossil fuels used to power the dredge, associated support equipment, and the motor vehicles of construction workers commuting to the Port; the labor used during construction; the few materials or supplies used during construction and the manufacture of any new equipment that cannot be recycled at the end of the project; and energy required for the production of the materials used in the new equipment. Such resources would be irrecoverable regardless of the disposal options selected. Given the relatively small scale of the project, these commitments of resources would not be considered substantial.

The dredging operations would result in a change in the distribution and diversity of some benthic species. Similar disturbance of benthic communities could occur at the disposal sites. While periodic disposal of dredged materials at an aquatic site modifies or precludes recolonization of the site to its natural state, none of the disposal sites considered is undisturbed. There would be some potential beneficial biological impacts from filling some of the borrow pit areas. The local ecology could be improved because a shallower habitat is generally more productive than deeper waters (see, for example, the U.S. Fish and Wildlife Service's Planning Aid Letter in Appendix E, and the 2020 Plan [COE, POLA, and POLB 1992]). Also, the shallower water would increase the amount of suitable habitat for California halibut spawning. No irreversible or irretrievable commitment of biological habitat would result from the project because the dredge and disposal areas would eventually (a few years) be recolonized by the same or similar types of marine species as existed prior to the dredging and disposal.

Based on the location within the project right-of-way of the probable shipwreck *Cricket No. 1*, project associated dredging could result in the irretrievable loss of a potentially important historic resource. However, the appropriate level of data recovery would mitigate the adverse effects of the dredging and the historical value of the ship would be retained.

The project has been modified to reduce potential irreversible and irretrievable commitments of resources by including in the recommended plan the placement options of the POLA Pier 400 landfill, the Main Channel borrow pit, and the Energy Island southeast pit, for the following reasons. Placing material at POLA Pier 400 would reduce the amount of "virgin" material that would need to be dredged at POLA to create this pier. By using the recommended placement sites, the large Energy Island borrow pit (the north pit), with a capacity of 7.2 mcy, is left available for future use as a placement site for potentially contaminated material that could require capping with clean sediments. The borrow pit at the mouth of the Los Angeles River, also initially considered for the proposed project, has been saved as a placement site for emergency dredging actions that will likely be needed in that immediate area in the future. Finally, if the material were placed at the deepwater LA-2 site, it could not be retrieved for any future beneficial use; in comparison, placement in shallower, nearshore borrow pits would allow the material to be removed if necessary for another use at some time in the future. Since the dredge sediment is cleaner than the sediment at the placement sites, it could be retrieved at some time in the future for use as capping material over other sediment that is less clean.

12.0 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Implementation of the proposed project would necessitate short-term use of the environment during the construction phase. Potential environmental impacts associated with this use of the environment are discussed in Chapter 4, as are mitigation measures for significant impacts. The only impacts that cannot be mitigated to insignificance are the emissions of oxides of nitrogen (NO_x) and reactive organic compounds (ROC) from the dredge and associated equipment during construction. However, as discussed in Chapter 4, all the environmental impacts associated with construction of the project would be of relatively short duration.

There would be no significant adverse impacts during operation (i.e., after completion of the dredging and placement activities). In fact, there would be long-term beneficial impacts on air quality and vessel transportation due to more efficient vessel and cargo handling operations at the Port. In this respect, the deepened channels would enhance the long-term productivity of the Port and its commercial users.

In summary, the short-term use of the environment necessary during construction of the project would not result in any significant long-term adverse impacts on the productivity of the environment.

13.0 PUBLIC INVOLVEMENT AND INTERAGENCY COORDINATION

13.1 PUBLIC INVOLVEMENT

Public comment on the proposed project was solicited pursuant to federal and state requirements. A federal Notice of Intent (NOI) was published in the *Federal Register* (Vol. 59, No. 205) on October 25, 1994, and a state Notice of Preparation (NOP) was issued on October 12, 1994. Together, the NOI and NOP identified a range of potential placement options for the dredged sediment: nearshore or onshore placement for beach nourishment at Peninsula Beach, Seal Beach, or Surfside-Sunset Beach; placement in borrow pits or at the approved offshore dump site LA-2; creation of additional landfill in either the POLB or Port of Los Angeles; placement at an upland (inland) landfill; and "sidecasting" for disposal of small quantities (e.g., 3,500 cy) of sediment immediately adjacent to the area being dredged. Together, the NOI and NOP address all potential alternatives considered in this EIS/R.

Public or agency concerns identified in written responses to the NOI and NOP that are pertinent to the proposed project included the following:

- Characterization of the existing water quality, marine resources, and habitats within and adjacent to the dredge and placement areas, and associated potential short- and long-term impacts on these resources.

- The need for a water quality certification from the RWQCB.

- The need for a consistency determination from the California Coastal Commission, including documentation of the need for the project; disposal alternatives considered; and potential impacts on water quality, marine resources, endangered species, and coastal recreation at and adjacent to the dredge and placement sites.

- Potential impacts on vessel transportation associated with the Long Beach Naval Shipyard.

Following distribution of the NOI and NOP, a public scoping meeting was held on November 1, 1994, at the POLB to receive agency and public comments regarding the proposed project. The few public concerns identified at the scoping meeting focused on the placement of the dredged material and included the following:

- Interest by local municipalities and a homeowners group in use of the dredged sediment for beach nourishment.

- Potential impacts on the hydrologic regime within San Pedro Bay from placement of dredged material.

13.2 INTERAGENCY COORDINATION

The LAD and POLB have conducted numerous meetings to coordinate the development of this project with other agencies, including the Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), the California Department of Fish and Game (CDFG), the California Coastal Commission (CCC), the Regional Water Quality Control Board

(RWQCB), State Historic Preservation Officer (SHPO), LAD Regulatory Section, local municipalities, and other agencies. These coordination efforts have involved discussions, meetings, and correspondence on primarily the following issues: sediment testing and resulting suitability determinations for various disposal options and uses, biological resources, and water quality. The first agency scoping meeting was held at the POLB on October 13, 1994. A meeting with resource agencies was held at the POLB on October 20, 1994, to receive their input on any concerns associated with the potential placement sites. A second meeting was held with resource agencies at the Port on February 9, 1995, to discuss the results of the alternative site screening process. Special status species of concern in the general project area were identified during these meetings as the California least tern, Pismo clam, grunion, and snowy plover. Staff from the LAD and POLB met with EPA staff in San Francisco on July 22, 1994, and February 13, 1995, to discuss sediment suitability determinations. There was additional coordination between the LAD and the EPA to refine the alternatives analysis during a meeting on March 3, 1995. At that meeting, the EPA recommended using the placement sites that were selected as part of the recommended plan (POLA Pier 400 landfill, Main Channel borrow pit, and the small Energy Island borrow pit) so that the large Energy Island borrow pit could be used for future sediment capping opportunities. The LAD also met with the CCC to discuss overall project goals, analyses, and direction on March 31, 1995.

The USFWS' updated list of proposed and listed threatened or endangered species that may occur in the project area, dated November 15, 1994, is provided in Appendix A. The USFWS' Planning Aid Letter, dated December 22, 1994, is also included in Appendix A. A draft Coordination Act Report, prepared by the USFWS, is expected on May 15, 1995.

In order for the project to be in full compliance with Section 106 of the National Historic Preservation Act, coordination with the SHPO has been initiated (see Appendix A). If either of the seafloor targets 2 or 10/17 are determined to be eligible for National Register listing, further coordination with the Advisory Council on Historic Preservation would need to be completed.

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Rossmiller, Tom. Harbors, Beaches, and Parks Department; Orange County Environmental Management Agency. RE: Information on visitor usage of Orange County beaches.

Rynas, Steve. California Coastal Commission, Long Beach, California, RE: Applicability of the Coastal Act policies to the project; existence of certified Local Coastal Plans for the project area.

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Summers, A.J. Lifeguard Department, City of Seal Beach. RE: Information on recreational facilities at and visitor usage of Seal Beach.

Whittenberg, Lee. City of Seal Beach, Planning Department. RE: Availability of baseline data in vicinity of Seal Beach.

Williams, Bruce. Coastal Resources Study Manager, U.S. Army Corps of Engineers, Los Angeles District. RE: Construction and operational phase vessel traffic, and miscellaneous project description details.

16.0 LIST OF PREPARERS

Name	Title	Experience	Role in Preparing EIS/R
Corps of Engineers - Los Angeles District			
Pamela Castens	Chief, Environmental & Planning	10 years	Quality Control
Stephen Dibble	Senior Archaeologist	11 years	Quality Control for Cultural Resources
Steve Fine	Chief, Coastal Resources Branch	20 years	Quality Control
Russell L. Kaiser	Environmental Manager/Marine Ecologist	7 years	EIS/R Project Manager; Oceanography and Water Quality
Richard Perry	Archaeologist	8 years	Cultural Resources
Ruth Villalobos	Chief, Environmental Resources Branch	20 years	Quality Control
Bruce Williams	Coastal Engineer	7 years	Feasibility Study Manager
Port of Long Beach			
Stacey Crouch	Environmental Specialist Associate	6 years	EIS/R Project Manager
Robert Kanter	Manager of Environmental Planning	24 years	Port of Long Beach Reviewer
Geraldine Knatz	Director of Planning	18 years	Port of Long Beach Reviewer
SAIC			
Steven Fusco	Senior Program Manager	21 years	Program Manager
Deborah Pontifex	Senior Scientist	14 years	EIS/R Project Manager; Land and Water Use
Brenda Bowser	Senior Scientist	12 years	Geology and Topography
Tamara Klug	Biological Analyst	3 years	Marine Resources support

Name	Title	Experience	Role in Preparing EIS/R
SAIC			
David Savinsky	Chemical Engineer	8 years	Air Quality
Lisbeth Springer	Senior Environmental Planner	15 years	Noise; Socioeconomics; Aesthetics
David Stone	Senior Scientist	19 years	Cultural Resources; Transportation
Eric Tambini	Geologist	8 years	Topography and Geology
Rosemary Thompson	Senior Biologist	23 years	Oceanography and Water Quality; Marine Resources
Lorraine Woodman	Senior Scientist	13 years	Noise; Socioeconomics; Aesthetics
Steve Ziemer	Senior Air Quality Scientist	19 years	Air Quality
Moffatt & Nichol Engineers			
Alan Alcorn	Senior Civil Engineer	14 years	Engineering Coordination

17.0 ACRONYMS

AADT	annual average daily traffic volumes
ADT	average daily traffic
APE	Area of Potential Effects
ARB	California Air Resources Board
BACT	Best Available Control Technology
BARCT	Best Available Retrofit Control Technology
BMP	Best Management Practices
BOD	biochemical oxygen demand
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAR	Coordination Act Report
CCAA	California Clean Air Act
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDWR	California Department of Water Resources
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Data Base
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act
cy	cubic yards
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
dB	decibel
dBA	A-weighted decibel
DDNI	Deep Draft Navigation Improvements project for the Los Angeles and Long Beach Harbors
DO	dissolved oxygen
DOHS	California Department of Health Services
DWT	dead weight tonnage
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Administration
FONSI	Finding of No Significant Impact
FWS	U.S. Fish and Wildlife Service
gpm	gallons per minute
km	kilometer
LAD	U.S. Army Corps of Engineers, Los Angeles District

L_{dn}	day-night equivalent noise level
L_{eq}	energy equivalent noise level
LOS	level of service
MCL	maximum contaminant level
mcy	million cubic yards
MHHW	mean higher high water
MLLW	mean lower low water
mph	miles per hour
msl	mean sea level
$\mu g/m^3$	micrograms per cubic meter
mg/L	milligrams per liter
mgd	million gallons per day
MPRSA	Marine Protection, Research, and Sanctuaries Act
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
ng/L	nanograms per liter
NGVD	1929 National Geodetic Vertical Datum (mean sea level in 1929)
nm	nautical mile
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOI	Notice of Intent
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NSC	Naval Supply Center
NTU	nephelometric turbidity unit
ODMDS	ocean dredged material disposal site
OMZ	oxygen minimum zone
O_3	ozone
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
POLA	Port of Los Angeles
POLB	Port of Long Beach
PM_{10}	particulate matter smaller than 10 microns in diameter
ppm	parts per million
ppt	parts per thousand
ROC	reactive organic compound
ROI	region of influence
RWQCB	Regional Water Quality Control Board
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLC	State Lands Commission
SO_2	sulfur dioxide
SPP	suspended particulate phase
STLC	soluble threshold limit concentration
SWRCB	State Water Resources Control Board
TBT	tributyltin

TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TEU	20-foot equivalent unit
TOC	total organic compounds
TOG	total organic gases
TPH	total petroleum hydrocarbons
TSS	total suspended solids
TTLC	total threshold limit concentrations
TVS	total volatile solids
USEPA	U.S. Environmental Protection Agency
U.S.C.	United States Code
V/C	volume-to-capacity ratio (transportation)
VOC	volatile organic compounds
VPH	vehicles per hour
VTS	Vessel Traffic Service
WES	U.S. Army Engineer Waterways Experiment Station
WET	waste extraction test
WQC	water quality criteria
WQOL	water quality objective limits
WRDA	Water Resources Development Act

18.0 LIST OF MEASUREMENTS

cm	centimeters
cm/sec	centimeters per second
cy	cubic yards
°C	degrees Celsius
°F	degrees Fahrenheit
ft	feet
km^2	square kilometers
m	meters
m^2	square meters
mcy	million cubic yards
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ng/L	nanograms per liter
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
μg - Atoms/L	micrograms- atoms per liter
μg/L	micrograms per liter
μM/L	micromoles per liter

Unit Conversions

Multiply	*By*	*To Obtain*
milligrams per liter	1	parts per million (fluid)
milligrams per kilogram	1	parts per million (soils, sediments)
micrograms per liter	1	parts per billion (fluid)
nanograms per liter	1	parts per trillion (fluid)
feet	0.3048	meters
miles (nautical)	1.853	kilometers
miles (statute)	1.609	kilometers
inches	2.540	centimeters
cubic yards	0.7646	cubic meters
miles per hour	44.70	centimeters per second
square feet	0.09290	square meters
square meters	0.0001	hectares
acres	2.47	hectares
square miles (nautical)	3.434	square kilometers
μM/L	molecular weight	micrograms per liter
μg - Atoms/L	1/atomic weight	micrograms per liter

Multiples and Submultiples

Prefix	*Symbol*	*Equivalent*	*Factor*
nano-	n	billionth part	$x\ 10^{-9}$
micro-	μ	millionth part	$x\ 10^{-6}$
milli-	m	thousandth part	$x\ 10^{-3}$
centi-	c	hundredth part	$x\ 10^{-2}$
kilo-	k	thousandfold	$x\ 10^{3}$

19.0 GLOSSARY

Anchorage area: An area designated by the U.S. Coast Guard for the anchoring of ships in the harbor.

Berth: The water area at the waterfront edge of a wharf, reserved for a vessel. The term is sometimes used to refer to the dock or wharf structure.

Bioassay: The use of living organisms to determine the effect of some substance, factor, or condition.

Borrow pit: A man-made depression (for the proposed project, in a nearshore aquatic environment) formed during past dredging activities.

Breakwater: An engineering structure to provide shelter from wave action.

Channel: The buoyed, dredged, and policed fairway through which ships proceed from the sea to their berth or from one berth to another within the harbor.

Community: As in "plant community" or other type of biological community; a distinctive collection of species occurring together in a particular habitat.

Construction staging area: An area where construction equipment, supplies, and construction offices are located.

Decibel: A unit of sound measurement.

Dredging: The removal of bottom sediments in order to deepen or widen a waterway.

Filter feeding: Obtaining food by passing water through a filtering mechanism.

Holocene (Recent): The post-Pleistocene geological epoch characterized by fluctuating but generally moderate climates, rising sea levels, and modern animal species; dating to approximately 11,000 years before present, to the present.

Hopper dredge: A type of dredge that picks up material by pulling a suction drag along the bottom; the excavated material is stored on board in the vessel's hopper. This type of dredge is self-propelled. When the hopper is full, the dredge travels to the disposal site to unload the dredged material, usually by bottom dumping.

Inversion: A condition where a layer of cool air or water is trapped under a layer of warm air or water so that it cannot rise.

Lead agency: The public agency that has the principal responsibility for carrying out or approving a project.

Lightering: Offloading a portion of a ship's cargo onto another, smaller vessel outside a harbor until the incoming ship's draft is reduced to the point where it can safely transit to the terminal.

Mean lower low water: The average height of the lower of the daily low tides.

Monobuoy: An open-water moorage where a ship is tied to a floating buoy anchored to the sea floor; the moored ship is free to pivot around the buoy in a weather-vane fashion in response to wind, wave, and tidal conditions.

Nautical mile: An international unit of distance equal to about 6,076.115 feet.

Nephelometer: A device for measuring the size and concentration of particles in a liquid by an analysis of the light transmitted through or reflected by the liquid.

Nutrient: A substance that promotes growth or provides energy for biological processes; common nutrients are phosphate, nitrate, calcium, and potassium.

Phytoplankton: Microscopic, usually one-celled plants that drift in the surface waters of the ocean.

Pier: The location in a seaport at which cargo arrives or departs. A dock for loading or unloading ships or vessels.

Pleistocene: A late Cenozoic geologic epoch characterized by fluctuating, generally cool climates -- often accompanied by glaciation -- and distinctive animal species, dating from 3 million years ago until approximately 11,000 years ago.

Pliocene: The late Cenozoic geologic epoch following the Miocene and preceding the Pleistocene; dating from approximately 5 million until 3 million years ago.

Responsible agency: A public agency other than the lead agency that has responsibility for carrying out or approving a project.

Sediment: Particles and fine matter heavy enough to settle to the bottom of a water column.

Seiche: An oscillation of the surface of a lake or landlocked sea that varies in period from a few minutes to several hours.

Spud: An extendible pile mounted on the side of a dredge or barge which can be driven into bottom sediments under its own weight to anchor the dredge or barge into position.

Turbidity: A cloudy, hazy condition in the water due to the presence of suspended particles, reducing the transmission of light.

Unconsolidated sediments: Those sediments that have not been compressed into a firm consistency; mud.

Appendix A

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2711
LOS ANGELES, CALIFORNIA 90053-2325

REPLY TO
ATTENTION OF

October 13, 1994

Office of the Chief
Environmental Resources Branch

State of California
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, California 94296-0001

Dear Ms. Widell:

This is an open invitation to all interested agencies to attend a scoping workshop to discuss and encourage the exchange of information regarding the U.S. Army Corps of Engineers, Los Angeles District (LAD) Feasibility Study and Environmental Impact Statement/Report (EIS/R) for the Queens Gate Entrance Channel Deepening Project, Long Beach Harbor, Los Angeles County, California. This scoping workshop will initiate the public involvement process to ensure that all problems, needs, issues, concerns, and potential solutions are considered in the study scope. This workshop will be conducted on October 20, 1994, at 10:00 a.m., in the Board Room at the Port of Long Beach Administrative Building, 925 Harbor Plaza, Long Beach, California.

To date, deep draft vessels entering the Queens Gate entrance channel are constrained by existing depths, and forced to enter the harbor light-loaded. In order to increase product delivery efficiency, a plan has been developed to deepen the area seaward of Queens Gate.

The LAD is considering dredging a navigation channel from the Queens Gate entrance of the harbor to the -76 foot contour depth to allow vessels to enter the harbor fully loaded. The dimensions of the proposed navigation channel are approximately 1,200 feet in width, 15,000 feet in length, to a depth of -76 feet MLLW (from current depths of between -59 and -69 MLLW). Alternative disposal scenarios for the five million cubic yards of material generated by dredging include beach nourishment at a series of potential on/nearshore sites from Alamitos Peninsula to Surfside/Sunset beaches, or offshore disposal sites, including borrow pits near the oil islands in San Pedro Bay or the EPA approved LA-2 site. Figure 1 identifies the overall project area; Figure 2 delineates the proposed dredge area, and Figure 3 depicts potential renourishment and disposal areas.

Pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), a full array of alternatives will be developed for further analyses. The proposed plan, viable project alternatives, and the "no action" will be carried forward for a detailed impact analysis. Resource categories that will be analyzed include: geology, oceanography and water quality, air and noise quality, marine resources and endangered and threatened species, cultural resources, socioeconomics, land/water use, recreation, ground and vessel traffic and safety, energy, and aesthetics.

As a part of NEPA/CEQA, the LAD will also conduct a public scoping meeting with the Port of Long Beach on November 1, 1994, at 7:00 pm, in the Board Room at the Port of Long Beach Administrative Building, 925 Harbor Plaza, Long Beach, California. All attendees will be offered a full opportunity to express their views on matters pertinent to problems, needs, issues, and concerns relative to the proposed project. A record of proceedings will be taken, and a transcript prepared. Oral statements will be heard during the meeting. For the accuracy of the record, it is recommended that all statements and information be submitted in writing, although oral statements at the meeting are encouraged. Written statements may be submitted at the meeting or mailed to the LAD at the address below. All statements, oral or written, will become part of the official public record of the study.

It is particularly important that agency representatives and individuals who cannot attend the public scoping meeting mail their comments or concerns to the LAD by November 21, 1994. Information or questions regarding this project should be directed to Mr. Russell L. Kaiser, Environmental Manager, Environmental Planning Section, Environmental Resources Branch, at the U.S. Army Corps of Engineers, P.O. Box 2711, Los Angeles, California, 90053-2325 or by telephone at 213-894-0247.

We have attempted to send this information to all agencies who may have interest in the proposed project, and should be offered the opportunity to attend these meetings. If you know of individuals who may desire to attend and have not been contacted by us, please bring this invitation to their attention.

Sincerely,

Robert S. Joe
Chief, Planning Division

Enclosures

WORLDPORT LA
Richard J. Riordan, Mayor, City of Los Angeles
Board of Harbor Commissioners
Frank M. Sanchez, Ph.D., President
Lee M. Anderson, Vice President
Carol L. Rowen
Jonathan Y. Thomas
Leland Wong
Peter Mandia, Secretary
Ezunial Burts
Executive Director

March 7, 1995

Ms. Geraldine Knatz, Ph.D.
Director of Planning
Port of Long Beach
P. O. Box 570
Long Beach, CA 90801-0570

Dear Dr. Knatz:

SUBJECT: FEASIBILITY STUDY FOR DEEP DRAFT NAVIGATION IMPROVEMENTS AT LONG BEACH HARBOR

Thank you for providing a copy of the geotechnical and environmental investigation information for the subject project. We have reviewed the provided information for engineering, environmental and regulatory issues related to use of your project dredge material in our Stage I Pier 400 Dredging and Landfill Project. Based on our review, we are respectfully requesting that full consideration be given to use of approximately 2 to 2 1/2 million cubic yards of sandy material within our project as a disposal alternative. The Port of Los Angles would take responsibility for any financial obligation beyond that of the federal and nonfederal sponsor economic requirements of the Corps' NED Plan. Furthermore, we believe the environmental assessment for this activity has been previously assessed in the Corps of Engineers Environmental Impact Statement for Deep Draft Navigation Improvements at Los Angeles and Long Beach Harbors, dated September 1992.

We are available to meet and discuss this request and to provide any necessary information.

Should you have any questions regarding the above, please contact John Foxworthy at (310) 732-3571.

Very truly yours,

Vernon E. Hall

VERNON E. HALL
Chief Harbor Engineer

JF:py
166
File No. 135.23795(B).127

cc: Bruce William - Corps of Engineers
Brian Ross - Environmental Protection Agency

DEPARTMENT OF THE NAVY
LONG BEACH NAVAL SHIPYARD
300 SKIPJACK RD
LONG BEACH, CALIFORNIA 90822-5099

IN REPLY REFER TO:

5090
Ser 1170/295
29 NOV 1994

Mr. Russell M. Kaiser
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053

SUBJECT: NOTICE OF PREPARATION (NOP) OF A DRAFT EIS/EIR
QUEEN'S GATE DEEPENING PROJECT

The above referenced proposed project involves dredging the entry into Queen's Gate to approximately -76 feet Mean Lower Low Water (MLLW) over a period of 12 to 18 months. The following comments are provide to assist in the preparation of the Draft EIS/EIR:

According to information provided in Section 9 - Transportation, the proposed project could temporarily disrupt ship movements through Queen's Gate and that the impacts would be minimized by scheduling dredging and disposal activities around known ship calls. Ships arriving and departing Long Beach Naval Shipyard (LBNSY) use the Queen's Gate opening in the breakwater. These ship movements are not scheduled as commercial ship movements are and, therefore, are not "known calls". The EIR/EIS should address the potential impact to ship movements at LBNSY and ways to mitigate that impact.

Thank you for the opportunity to comment on the NOP. We would like the opportunity to review and comment on the draft EIR/EIS when it becomes available. The Shipyard point of contact is C. Anna Ulaszewski at 547-7868.

Sincerely,

L. H. SMITH
Supervisor
Environmental Protection Division
Direction of the Shipyard Commander

Copy to:
Ms. Stacey Crouch - Environmental Specialist
Planning Department
The Port of Long Beach
P. O. Box 570
Long Beach, CA 90801-0570

STATE OF CALIFORNIA—ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
101 CENTRE PLAZA DRIVE
MONTEREY PARK, CA 91754-2156
(213) 266-7500
FAX: (213) 266-7600

November 14, 1994 File:700.135

Russel M. Kaiser
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053

SCH #94101039: QUEEN'S GATE DEEPENING PROJECT

We have reviewed the subject document regarding the proposed project, and have the following comments:

☐ We have no further comments at this time.

☑ The proposed project should address the attached comments.

Thank you for this opportunity to review your document. If you have any questions, please contact Manjunath Venkatanarayana at (213) 266-7556 or myself at (213) 266-7549.

for Deborah J. Smith, Chief
Planning Unit

cc: State Clearing House
Sacramento

SOIL EROSION CONCERNS:

☑ a. Every precaution should be taken to prevent water quality impacts resulting from soil erosion and increased surface runoff, especially during grading and construction activities.

☑ b. We encourage the development of a comprehensive Nonpoint Source Management Plan with appropriate structural and nonstructural Best Management Practices (BMPs). These BMPs could be submitted as part of a Stormwater Pollution Prevention Plan (SWPPP) in the EIR of the proposed project.

☐ c. Based on the information provided, the project site is in an area potentially subject to high erosion and high mud flows resulting in sedimentation problems. Development of the site may result in additional impermeable surfaces, which could intensify storm water runoff and accelerate soil erosion. The EIR should address additional erosion control measures specifically geared to minimize this tendency for high erosion in the project area.

☑ d. In any construction project that totals more than five acres, it is necessary to file a Notice of Intent to be covered under the State Board's "Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity" (General Permit No. CAS000002). To receive additional information on requirements for stormwater discharges and NPDES related matter, please contact Mark Pumford at (213) 266-7596 at this Regional Board.

BENEFICIAL USE IMPACTS AND WATER QUALITY CERTIFICATION:

☑ a. The EIR should clearly identify all waterbodies in the project site area (both surface and groundwater) that may be impacted by the proposed activity. A detailed site map showing the project location in relation to nearby waterbodies should be included.

☑ b. Any potential adverse impacts to the designated beneficial uses of these waterbodies should be discussed. Discussion of appropriate mitigation measures, such as Best Management Practices (BMPs) designed to protect these beneficial uses should be included in the EIR. Project proponents must demonstrate compliance with all State and Regional Board water quality objectives, beneficial uses, and the anti-degradation policy. This compliance must be demonstrated not only for the final project but also during construction phase.

☑ c. For a complete listing of beneficial use designations and their descriptions, please refer to our ***Water Quality Control Plan: Santa Clara River Basin (4A) and Los Angeles River Basin (4B)***. To obtain a copy of the Basin Plan, please call Vilma Correa at (213) 266-7519.

☑ d. Any fill and dredge activity, including bank stabilization, within "the waters of the U.S." requires a Section 404 permit from the U.S. Army Corps of Engineers. Also, when section 404 permit is required, project proponents will need to apply for a **Section 401 Water Quality Certification** from this Regional Board. For more information on requirements for Section 401 Water Quality Certification, please contact Lauma Jurkevics at (213) 277-7609.

☑ e. Final disposal actions (whether land based or into any waterbody) of dredged and excavated materials has to be described in the EIR. The receiving land or water body must be identified. Prior to inland disposal of **non-hazardous** excavated soils (other than that returned to original excavated site), a general Waste Discharge Requirement (WDR) has to be obtained from this Regional Board. Please contact John Lewis at (213) 266-7646.

NATURAL HABITAT CONCERNS:

☑ a. Avoidance of Wetland and Riparian Habitats is the preferred alternative to limit impacts to water quality and protection of designated beneficial uses. When bank and/or instream projects are proposed, the hydrology of the area changes and can result in further degradation of regional waters.

☑ b. The EIR should clearly identify and characterize the extent of the existing riparian zone or wetlands on site and any loss of riparian or wetland habitat, which would result from the proposed activity.

☑ c. Please address immediate and long-term impacts resulting from the proposed stream modifications on the riparian/wetland vegetation and the hydrology of the waterbody(ies) likely to be impacted by the proposed activity.

☑ d. The EIR should address appropriate Best Management Practices (BMPs) to mitigate impacts during grading and construction activities, including any vegetative restoration work. We strongly encourage planting of native vegetation.

☐ e. The proposed project is located in a sensitive ecological area or an area designated as a unique ecological habitat (habitat supporting unique species of plants and animals). Therefore, the EIR should discuss in detail, steps taken to avoid or mitigate adverse impacts (such as protection measures to safeguard flora and fauna, buffer zones, habitat restoration, etc). Please consult with the State Department of Fish and Game before implementing these projects.

☐ f. Prior to any discharge of groundwater to surface waters as a result of any dewatering activities that may occur during construction, you will need to contact Josh Workman at (213)266-7615 to obtain a general permit for such discharges.

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

November 14, 1994

Bruce Williams
Long Beach Harbor Study Manager
Coastal Resources Branch
U.S. Army Corps of Engineers
P.O. Box 2711
Los Angeles, CA 90053-2325

Subject: Queens Gate Deepening Project, Port of Long Beach.

Dear Mr. Williams:

This letter is to inform you that a consistency determination will need to be submitted to the California Coastal Commission for the above Corps of Engineers activity, because it would generate effects on the California coastal zone. This regulatory requirement arises under Section 307 of the federal Coastal Zone Management Act (U.S.C. Section 1456, et seq., with implementing regulations at 15 CFR Part 930). The consistency determination should include a finding as to whether the project is consistent to the maximum extent practicable with the California Coastal Management Program and the necessary information to support that conclusion, including an analysis of the project's consistency with Chapter 3 of the Coastal Act (for that portion of the project outside the Port of Long Beach) and Chapter 8 of the Coastal Act (for that part of the project within the Port). (See 15 CFR Section 930.39 for a full listing of the information required for a complete consistency determination.) The consistency determination should document the need for the project, examine dredged material disposal alternatives, and address potential project impacts to marine resources, water quality, endangered species, and coastal recreation at and adjacent to the dredge and disposal sites.

If you have any questions about this matter, please contact me at (415) 904-5280.

Sincerely,

Larry Simon
Staff Analyst

cc: Stacey Crouch, POLB
Russell Kaiser, COE
Teresa Henry, CCC-LB
State Clearinghouse

1850p

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California 92008

November 15, 1994

Mr. Robert S. Joe
U.S. Department of the Army
Army Corps of Engineers
P.O. Box 2711
Los Angeles, CA 90053

Re: Request for Candidate, Proposed, Threatened, or Endangered Species for the Queens Gate Entrance Channel Deepening Project, Long Beach Harbor, Los Angeles County, California (1-6-95-SP-042)

Dear Mr. Joe:

This letter is in response to a request dated November 6, 1994, requesting information on potential species of concern within the proposed project area. We are providing a list of endangered, threatened, and candidate species which may be present within the area of the project within the jurisdiction of the Carlsbad Field Office. The enclosed list of species partially fulfills the requirements of the Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act).

Section 7(a)(2) of the Act requires a Federal Agency, in consultation with, and with the assistance of the Service, insure that any action it authorizes, funds, or carries out, is not likely to jeopardize the continued existence of any listed species or results in the destruction or adverse modification of critical habitat. To meet this requirement, Biological Assessments are required under section 7(c) of the Act if listed species or critical habitat may be present in the area affected by any major construction activity. Federal agencies have the responsibility to prepare a Biological Assessment if your proposed action is a major construction activity that requires the preparation of an Environmental Impact Statement. If a Biological Assessment is not required, your agency still has the responsibility to review its proposed activities and determine whether the listed species will be affected. Moreover, "action' means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. In addition, "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Section 7(d) of the Act prohibits Federal agencies and applicants from making any irreversible or irretrievable commitment of resources which has the effect of foreclosing the formulation or implementation of reasonable and prudent alternatives which would avoid jeopardizing the continued existence of listed species or resulting in the destruction of critical habitat.

During the assessmer or review process, the agencies may engage in planning efforts, but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(a) of the Act. If a listed species may be adversely affected, agencies should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation should be used to exchange information and resolve conflicts with respect to listed species prior to a written request for formal consultation.

A Federal agency is required to confer with the Service when the agency determines that its action is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. Conferences are informal discussions between the Service and the Federal agency, designed to identify and resolve potential conflicts between an action and proposed species or proposes critical habitat at an early point in the decision making process. The Service makes recommendations, if any, on ways to minimize or avoid adverse effects of the action. These recommendations are advisory because the jeopardy prohibition of section 7(a)(2) does not apply until the species is listed or the proposed critical habitat designated, and the Federal agency determines whether or not formal consultation is required. The conference process fills the need to alert Federal agencies of possible steps that an agency might take at an early stage to adjust its actions to avoid jeopardizing a proposed species.

Candidate species are included for the purpose of notifying a project proponent in advance of possible proposals and listings which at some time in the future may have to be considered in your planning activities. If early evaluation of a project indicates that it is likely to adversely impact a candidate species, we recommend that the Federal agency seek technical assistance from this office in an effort to avoid or reduce impacts to such species.

We want to closely coordinate with the Federal agency and applicant during the preparation of the Biological Assessment. Our goal would be to provide technical assistance that identifies specific features that could be incorporated into the project to avoid adverse impacts to listed species. Should you have any questions regarding the species listed or your responsibilities under the Act, please contact Shawnetta Grandberry at (619) 431-9440.

Sincerely,

for Gail C. Kobetich
Field Supervisor

Enclosure

"Construction Project" means any Federal action which significantly affects the quality of the human environment designed primarily to result in the building or erection of man-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorizations or approvals which may result in construction.

Listed Endangered, Threatened and Candidate Species that May Occur in the Area of the Queens Gate Entrance Channel Deepening Project, Long Beach Harbor, Los Angeles County, California (1-6-95-SP-042)

Common Name	Scientific Name	Status
<u>Listed</u> <u>Species</u>		
<u>BIRDS</u>		
Brown pelican	<u>Pelecanus</u> <u>occidentalis</u>	E
California least tern	<u>Sterna</u> <u>antillarum</u> (=albifrons) <u>browni</u>	E
Light-footed clapper rail	<u>Rallus</u> <u>longirostris</u> <u>levipes</u>	E
Peregrine falcon	<u>Falco</u> <u>peregrinus</u>	E
Marbled murrelet	<u>Brachyramphus</u> <u>marmoratus</u>	T
Western snowy plover (coastal populations)	<u>Charadrius</u> <u>alexandrinus</u> <u>nivosus</u>	T
<u>Candidate</u> <u>Species</u>		
<u>BIRDS</u>		
Elegant tern	<u>Sterna</u> <u>elegans</u>	C2
Harlequin duck	<u>Histrionicus</u> <u>histrionicus</u>	C2
Loggerhead shrike	<u>Lanius</u> <u>ludovicianus</u>	C2
Long-billed curlew	<u>Numenius</u> <u>americanus</u>	C2
Reddish egret	<u>Egretta</u> <u>rufescens</u>	C2
White-faced ibis	<u>Plegadis</u> <u>chihi</u>	C2

E: Endangered
T: Threatened
PE: Proposed Endangered
PT: Proposed Threatened
C1: Category "1" candidate for listing; taxa for which the Service has substantial information to support listing as threatened or endangered.

C2: Category "2" candidate for listing; taxa that may warrant listing but

Common Name	Scientific Name	Status

for which substantial information to support a proposed rule is lacking.

C3: Taxa that are not currently being considered for listing as threatened or endangered:

(3a): taxa for which the Service has persuasive evidence of extinction. However, any such taxon is certain to get high priority for listing if rediscovered.

(3b): taxa that currently do not meet the Act's definition of "species". Any such taxon could be reevaluated in the future as a result of subsequent research.

(3c): taxa that apparently more common than previously thought and thus not under current consideration for listing as threatened or endangered.

R: Recommended. Although not officially a candidate at the present time, species bearing this designation likely will be included in the recommended category in the next Notice of Review. Please note that some of these recommended candidates, like many of the category 1 and category 2 candidates listed above, are currently undergoing status review or are the subject of draft proposed rules.

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
1416 NINTH STREET
P.O. BOX 944209
SACRAMENTO, CA 94244-2090

November 22, 1994

Mr. Russel M. Kaiser
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, California 90053-2325

Dear Mr. Kaiser:

Department of Fish and Game personnel have reviewed the Notice of Preparation (NOP) and associated information for an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Queen's Gate Entrance Channel Deepening Project (SCH 94101039). The proposed project consists of deepening the approach channel to a depth of -76 feet Mean Lower Low Water (MLLW) from about 1,500 feet inside Queen's Gate to about 11,000 feet seaward from Queen's Gate. Approximately 5,000,000 cubic yards of material will be dredged from the area and disposed of at one or more disposal sites.

The document to be prepared should contain a description of existing water quality and marine resources and habitats within and adjacent to the proposed dredge area and an analysis of both short and long-term impacts to existing water quality and marine resources and habitats as a result of dredging. The NOP identifies several disposal options which will be evaluated in the EIS/EIR. The beach replenishment option for dredge material disposal, especially in areas under consideration for beach replenishment, could provide a beneficial use of dredge material and should be considered a preferred disposal option for suitable dredge sediments.

Should you have any questions, please contact Mr. Richard Nitsos, Environmental Specialist, Environmental Services Division, Department of Fish and Game, 330 Golden Shore, Suite 50, Long Beach, California 90802, (310) 590-5174.

Sincerely,

John L. Turner, Chief
Environmental Services Division

cc: Mr. Richard Nitsos
Department of Fish and Game
Long Beach

State Clearinghouse
Sacramento

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (909) 396-2000

October 26, 1994

Mr. Robert S. Joe
Chief, Planning Division
Department of the Army
Los Angeles District Corps of Engineers
P.O. Box 2711
Los Angeles, California 90053-2325

Subject: Long Beach Harbor Channel Improvements

Dear Mr. Joe:

I received your October 14, 1994, letter concerning the public information meeting and scoping workshop for the U.S. Army Corps of Engineers' Long Beach Harbor Feasibility Study. AQMD staff may not be available to attend the meeting.

For assessing air impacts for CEQA purposes planners should use the AQMD's "CEQA Air Quality Handbook" dated April 1993 with May 1993 Errata sheet and November 1993 updates, and the MAAQI Model of February 1994. For equipment and processes not included in the CEQA Handbook planners should refer to section A9-4(q) of the Handbook.

Planners of the project should advise potential contractors that AQMD permits are necessary for any equipment the use of which may cause the issuance of air contaminants or the use of which may reduce or control the issuance of air contaminants. This would include engines used on barges for channel excavation.

Please call me at (909) 396-2317 if you have questions.

Sincerely,

David T. Jones

David T. Jones
AQAC Supervisor
Public Facilities Team
Stationary Source Compliance

DJ:dj

cc: S. George

(LBHBREA)

SIMPSON THACHER & BARTLETT
A PARTNERSHIP WHICH INCLUDES PROFESSIONAL CORPORATIONS
425 LEXINGTON AVENUE
NEW YORK, N.Y. 10017-3954
(212) 455-2000

TELECOPIER: 455-2502
TELEX: 129158

LONDON
HONG KONG
TOKYO
COLUMBUS

WRITER'S DIRECT DIAL NUMBER
(212) 455-7255

December 14, 1994

<u>Re: Draft Environmental Impact Statement/Report for the Queens Gate Entrance Channel Deepening Project Long Beach Harbor, Los Angeles County, California</u>

Mr. Russell Kaiser
U.S. Army Corps of Engineers
Los Angeles District
Environmental Planning Section
P.O. Box 2711
Los Angeles, CA 90053

Dear Mr. Kaiser:

Please send me complete copies of the above referenced documents, as announced at 59 FEDERAL REGISTER 53638 (October 25, 1994), as they become available. Also, please send me copies of the figures mentioned in the FEDERAL REGISTER notice. Furthermore, please add my name to any mailing list that you may have related to this matter.

Thank you.

Very truly yours,

Tomáš J. Vachuda

APPENDIX B

Regulatory Framework

1. Federal Regulations

Clean Air Act of 1969 (42 U.S.C. Section 7401 et seq.)

Air quality regulations were first promulgated with the Clean Air Act (CAA) of 1969. The CAA is intended to protect the Nation's air quality by regulating emissions of air pollutants. The CAA is applicable to permits and planning procedures related to dredged material disposal onshore and within the territorial sea. The territorial sea is defined as waters 3 miles seaward of the nearest shoreline. For bays or estuaries, the 3-mile territorial sea begins at a baseline drawn across the opening of the water body. Section 118 of the CAA (42 U.S.C. 7418) requires that all federal agencies engaged in activities that may result in the discharge of air pollutants comply with state and local air pollution control requirements. In addition, Section 176 of the CAA (42 U.S.C. 7506) prohibits federal agencies from engaging in any activity that does not conform to an approved State Implementation Plan.

This act established the National Ambient Air Quality Standards (NAAQS) and delegated enforcement of air pollution control to the states. In California, the Air Resources Board (ARB) has been designated as the agency responsible for regulating air pollution sources at the state level. The ARB, in turn, has delegated the responsibility of regulating stationary emission sources to local air pollution control or management districts which, for the proposed project, is the South Coast Air Quality Management District (SCAQMD).

The NAAQS shown in Table B-1 include both primary and secondary standards for various pollutants. Primary standards are mandated by the CAA to protect the public health, while secondary standards are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant, such as materials soiling, vegetation damage, and visibility impairment.

The CAA states that all applicable federal and state ambient air quality standards must be maintained during the operation of any emission source. The CAA also delegates to each state the authority to establish their own air quality rules and regulations. State adopted rules and regulations must be at least as stringent as the mandated federal requirements. In states where the NAAQS are exceeded, the CAA requires preparation of a State Implementation Plan (SIP) that identifies how the state will meet the standards within the time frame mandated by the Clean Air Act Amendments of 1990.

The Clean Air Act Amendments of 1990 (42 U.S.C. 7401 et seq., as amended by P.L. 101-549)

The Clean Air Act Amendments of 1990 (1990 CAA) established new nonattainment classifications, new emission control requirements, and new compliance dates for areas presently in nonattainment of the NAAQS, based on upon the design day value. The design day value is the fourth highest pollutant concentration recorded in a 3-year period. The requirements and compliance dates for reaching attainment are based on the nonattainment classification. The classifications and compliance dates are shown in Table B-2.

Table B-1
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS
(page 1 of 2)

Pollutant	Averaging Time	California Standards[a,c]	National Standards[b] Primary[c,d]	National Standards[b] Secondary[c,e]
Ozone (O_3)	1-Hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	Same as Primary Standard
Carbon Monoxide (CO)	8-Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	-
	1-Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	-
Nitrogen Dioxide (NO_2)	Annual	-	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard
	1-Hour	0.25 ppm (470 $\mu g/m^3$)	-	-
Sulfur Dioxide (SO_2)	Annual		80 $\mu g/m^3$ (0.03 ppm)	-
	24-Hour	0.04 ppm (105 $\mu g/m^3$)	365 $\mu g/m^3$ (0.14 ppm)	-
	3-Hour	-	-	1,3000 $\mu g/m^3$ (0.5 ppm)
	1-Hour	0.25 ppm (655 $\mu g/m^3$)	-	-
Suspended Particulate Matter (PM_{10})	Annual	30 $\mu g/m^3$[f]	50 $\mu g/m^3$[g]	Same as Primary Standard
	24-Hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as Primary Standard
Sulfates	24-Hour	25 $\mu g/m^3$	-	-
Lead	30-Day	1.5 $\mu g/m^3$	-	-
	Quarterly	-	1.5 $\mu g/m^3$	Same as Primary Standard
Hydrogen Sulfide	1-Hour	0.03 ppm (42 $\mu g/m^3$)	-	-
Vinyl Chloride	24-Hour	0.010 ppm (26 $\mu g/m^3$)	-	-
Visibility Reducing Particles[h]	8-Hour (10 a.m. to 6 p.m.)	In sufficient amount to produce an extinction coefficient of 0.23 per km due to particles when the relative humidity is less than 70 percent. ARB Method V.	-	-

Table B-1
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS
(page 2 of 2)

Notes:

a. California standards for ozone, carbon monoxide, sulfur dioxide (1-Hour and 24-Hour), nitrogen dioxide, PM_{10}, and visibilty reducing particles are values that are not to be exceeded. The standards for sulfates, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded.

b. National standards other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

c. Concentration expressed first in units in which it was promulgated. Equivalent units given in parathensis are based upon a reference temperature of 25 °C and a reference pressure of 760 mm of mercury. All measurements of air quality are corrected to a reference temperature of 25 °C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

d. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

e. National Secondary Standards: The levels of air quality necessary protect the public welfare from any known or anticipated adverse effects from a pollutant.

f. Calculated as geometric mean

g. Calculated as arthmetic mean

h. This standrd is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visiual range when relative humidity is less than 70 percent.

ppm = parts per million
km = kilometer
ARB = Air Resources Board
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter

One of the requirements established by the 1990 CAA was an emission reduction amount, which would be used to judge how progress toward attainment of the ozone standards would be measured. The 1990 CAA requires areas in nonattainment of the NAAQS for ozone to reduce basinwide VOC emissions by 15 percent for the first 6 years and by an average 3 percent per year thereafter until attainment is reached. Control measures must be identified in the SIP that will facilitate the reduction in emissions and show progress toward attainment of the ozone standard. With regard to CO nonattainment areas, a plan must be submitted that identifies ways to reduce CO emissions and shows progress toward attainment. Additionally, the 1990 CAA promulgates new toxic air pollutant standards and identifies affected sources and control measures required to meet these standards.

The 1990 CAA also provides that a federal agency cannot support an activity in any way unless the federal agency determines that the activity will conform to the most recent EPA-approved SIP's purpose of attaining and maintaining the NAAQS. This means that federally supported or funded activities will not: (1) cause or contribute to any new violation of any air quality standard; (2) increase the frequency or severity of any existing violation of any standard; or (3) delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area. In accordance with Section 176[c] of the 1990 CAA, the EPA promulgated the final conformity rule for general federal actions in the November 30, 1993 *Federal Register*.

Table B-2
Federal Attainment Schedule

Pollutant/Classification	*Design Day Value Concentration [(a)] (ppm)*	*Compliance Date*
Ozone		
Marginal	0.121-0.138	November 15, 1993
Moderate	0.138-0.160	November 15, 1996
Serious	0.160-0.180	November 15, 1999
Severe	0.180-0.190	November 15, 2005
Severe	0.190-0.280	November 15, 2007
Extreme	>0.280	November 15, 2010
Carbon Monoxide		
Moderate	9.1-16.4	December 31, 1995
Serious	>16.4	December 31, 2000
PM_{10}		
Moderate	--	February 8, 1997
Serious	--	December 31, 2001

Note: (a) The design day value is the fourth highest pollutant concentration recorded in a 3-year period.
Source: Clean Air Act Amendments, November 1990.

Clean Water Act of 1972 (33 U.S.C. 1251 et seq.)

The Clean Water Act (CWA) was passed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Specific sections of the Act control the discharge of pollutants and wastes into aquatic and marine environments. The major section of the CWA that applies to dredging activities is Section 401, which requires certification that the permitted project complies with the State Water Quality Standards for actions within state waters. Under Section 301, states must establish Water Quality Standards for all state waters, including the territorial sea. Dredging or disposal of dredged material may not cause the concentrations of chemicals in the water column to exceed state standards.
Section 404 of the CWA addresses water-related activities and encompasses activities (consumptive and nonconsumptive) undertaken for amusement and relaxation. Section 404 also reflects that aesthetics of the aquatic ecosystem apply to the quality of life enjoyed by the general public and property owners. Section 404 prohibits the discharge of dredged or fill material into waters of the United States without a permit from the Corps.

Section 404(b)(1) establishes guidelines for the discharge of dredged or fill materials into the aquatic ecosystem. Subpart A, Section 230.1 ° of the Section 404(b)(1) guidelines states the following: "Fundamental to these guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern." Although sections 401 and 404(b) of the CWA apply, by their own terms, only to applications for federal permits, the Corps has made a policy decision to apply them to their own projects. This policy is set out in Corps regulations at 33 CFR Part 336. Section 336.1(a) of that regulation states, "Although the Corps does not process and issue permits for its own activities, the Corps authorizes its own discharges of dredge or fill material by applying all applicable substantive legal requirements, including public notice, opportunity for public hearing, and application of the Section 404(b)(1) guidelines."

The EPA works in direct consultation with the Corps concerning the Section 404 permit. Under 40 Code of Federal Regulations (CFR) 230, a complete analysis of the chemical constituents of the dredge material is required. Bioassays may be needed to address areas of concern. The Corps - Los Angeles District (LAD) has established quantitative guidelines for determining the compatibility of dredged material with the sediments at the receiving beach. Information on the physical characteristics of the dredged material and material at the receiving sites is described in this EIS/R. A Section 404(b)(1) evaluation has been completed and is included in Appendix D. By letter dated July 26, 1995, the Regional Water Quality Control Board (RWQCB) documented concerns pertaining to the disposal options identified in the Draft EIS/R. Those concerns have been adequately addressed and incorporated into the EIS/R accordingly. Based on recent coordination and discussions with the RWQCB, it is anticipated Section 401 certification will be obtained. The requirements of Sections 401 and 404 have been fulfilled.

Coastal Zone Management Act of 1976, as amended (Public Law 92-583; 16 U.S.C. 1456 et seq.)

Under the Coastal Zone Management Act (CZMA), first passed in 1972, any federal agency conducting or supporting activities directly affecting the coastal zone must proceed in a manner consistent with approved state coastal zone management programs, to the maximum extent practicable. If a proposed activity affects water use in the coastal zone (i.e., the territorial sea and inland), the federal agency must demonstrate that the activity is consistent with the state's coastal zone management program to the maximum extent practicable. The CZMA includes as part of its policy maximizing public access, and encourages states to give full consideration to aesthetic values.

The Coastal Zone Reauthorization Amendments of 1990 (Section 6208) state that any federal activity, regardless of its location, is subject to the CZMA consistency requirement if it will affect any natural resources, land uses, or water uses in the coastal zone. No federal agency activities are categorically exempt from this requirement. In accordance with the provisions set forth in the CZMA, a Coastal Consistency Determination (CCD) was prepared by LAD. A hearing was held on September 13, 1995 whereby the California Coastal Commission (CCC) concurred with the LAD for the necessary consistency determination. A copy of the CCD is included in Appendix G.

Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)

The Endangered Species Act protects threatened and endangered species by prohibiting federal actions that would jeopardize the continued existence of such species or that would result in the destruction or adverse modification of any critical habitat of such species. Section 7 of the Act requires that consultation regarding protection of such species be conducted with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) prior to project implementation. During the project planning process, the USFWS and NMFS evaluate the potential impacts of all aspects of the project on threatened or endangered species. Their findings are contained in letters that provide an opinion on whether a project will jeopardize the continued existence of endangered species or modify critical habitat. If a jeopardy opinion is issued, the resource agency will provide reasonable and prudent alternatives, if any, that will avoid jeopardy. A non-jeopardy opinion may also be accompanied by reasonable and prudent measures to minimize incidental take (loss or disturbance of individuals) caused by the project. The Corps requested a list of candidate, proposed, threatened and endangered species known or expected to occur within the project area from the USFWS by letter dated November 6, 1994. The USFWS provided the requested list by letter dated November 15, 1994. Predicated upon the implementation of the mitigation measures, no federally listed threatened or endangered species, or their critical habitat, will be affected by the proposed action. Concurrence from the USFWS on this finding is documented in the Draft Coordination Act Report (CAR), dated September 13, 1995. The recommendations outlined in the Draft CAR pertaining to federally listed species will be incorporated into the construction plans and specifications, as appropriate, to avoid jeopardizing the continued existence of federal threatened or endangered species. The proposed action is in compliance with the Endangered Species Act.

Executive Order 11593 (Protection and Enhancement of the Cultural Environment)

This Order, signed by the President of the U.S. on May 13, 1971, asserts that the federal government shall provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the nation. It directs federal agencies: (1) to ensure preservation of cultural resources under federal ownership and ensure that federal plans and programs contribute to the preservation and enhancement of nonfederally owned sites; (2) to locate, inventory, and nominate to the National Register properties under their control or jurisdiction that meet the criteria for nomination; and (3) to exercise caution during the interim period to ensure that cultural resources under their control are not inadvertently damaged, destroyed, or transferred before the completion of inventories and evaluations of properties worthy of nomination to the National Register. It also directs the Secretary of the Interior to undertake certain advisory responsibilities in compliance with the Order.

Federal Water Project Recreation Act of 1965 (Public Law 89-72)

This Act established the federal policy that any investigation or plan for any federal navigation, flood control, reclamation, hydroelectric, or multi-purpose water resource project must give full consideration to the opportunities for outdoor recreation and for fish and wildlife enhancement. Wherever any such project can reasonably serve either or both of these purposes, it must be constructed, operated, and maintained accordingly.

Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.)

The Fish and Wildlife Coordination Act requires that whenever any body of water is proposed or authorized to be impounded, diverted, or otherwise controlled or modified, the lead federal agency must consult with the USFWS, the State agency responsible for fish and wildlife management (in California, the Department of Fish and Game) and, for projects affecting marine fisheries, the National Marine Fisheries Service (NMFS). Section 662(b) of the Act requires the lead federal agency to consider USFWS and other agencies' recommendations. The recommendations may address wildlife conservation and development, any damage to wildlife attributable to the project, and measures proposed for mitigating or compensating for these damages. The Act is applicable to the LAD's and EPA's evaluations of consistency with CWA Section 404 and MPRSA Section 103 requirements. Both informal and formal coordination with the USFWS has occurred throughout the planning process. Information contained in the Planning Aid Letter (PAL), dated December 22, 1994, was considered during the preparation of this EIS/R. A draft CAR was received on September 20, 1995. Recommendations set forth in the Draft CAR, dated September 13, 1995, for fish and wildlife resources are consistent with the objectives of the mitigation measures outlined in the EIS/R. However, specific fish and wildlife resource recommendations will need to be appropriately addressed during the preparation of the construction plans and specifications, prior to construction. Coordination with the USFWS will continue throughout all aspects of the project. A copy of the Draft CAR is included in Appendix E.

Marine Mammal Protection Act of 1972 (16 USC section 1361 et seq.)

This Act prohibits taking or harassment of any marine mammals except incidental take during commercial fishing, capture under scientific research and public display permits, harvest by Native Americans for subsistence purposes, and any other take authorized on a case-by-case basis as set forth in the Act. The USFWS, is responsible for the polar bear, sea otter, marine otter, walrus, manatees, and dugong, while NMFS is responsible for all other marine mammals.

Marine Protection, Research, and Sanctuaries Act of 1972 (Ocean Dumping Act) (33 U.S.C. 1401 et seq.)

The MPRSA regulates the transportation and ultimate disposal of material in the ocean, prohibits ocean disposal of certain wastes without a permit, and prohibits the disposal of certain materials entirely. This Act applies only to the LA-2 disposal site. Prohibited materials include those that contain radiological, chemical, or biological warfare agents, high-level radiological wastes, and industrial waste. MPRSA has jurisdiction over all United States ocean waters in and beyond the territorial sea, vessels flying the U.S. flag, and vessels leaving U.S. ports.

Section 102 of the Act authorizes EPA to promulgate environmental criteria for evaluation of all dumping permit actions, to retain authority over Corps MPRSA 103 permits, and to designate ocean disposal sites for dredged material disposal. EPA's regulations for ocean disposal are published at 40 CFR Parts 220-229. The Corps and EPA would apply the same substantive requirements to Corps dredging projects as to a permitted project. The permitting regulations promulgated by the Corps, under the MPRSA, appear at 33 CFR Parts 320 to 330 and 335 to 338. Based on an evaluation of compliance with the regulatory criteria of 40 CFR Part 227, both EPA and the Corps may prohibit or restrict disposal of material that does not meet the criteria. The EPA and Corps also may determine that ocean disposal is inappropriate because of management restrictions on an ocean dredged material disposal site (ODMDS) or because options for beneficial use(s) exist. Site management guidance is provided in 40 CFR 228.7-228.11. EPA is currently in the process of recertifying the LA-2 site.

39-785 97 - 12

Migratory Bird Conservation Act of 1929 (16 U.S.C. 715 et seq.)

This Act protects migratory birds by creating the Migratory Bird Conservation Commission. The Commission's purpose is to consider and approve the purchase, rental, or other acquisition of any areas of land or water that may be recommended by the Secretary of Interior for the purpose of establishing sanctuaries for migratory birds.

Migratory Bird Treaty Act of 1972 (16 U.S.C. 703 et seq.)

This Act protects certain migratory birds by limiting the hunting, capturing, selling, purchasing, transporting, importing, exporting, killing, or possession of these birds or their nests or eggs. The specific migratory birds covered are identified in separate agreements between the United States and the countries of Great Britain, Mexico, and Japan.

National Environmental Compliance Act of 1969, as amended (Public Law 91-190)

The National Environmental Compliance Act includes the improvement and coordination of federal plans to attain the widest range of beneficial uses of the environment and to achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities. It also includes guidelines for the improvement and coordination of federal plans to ensure aesthetically pleasing surroundings.

National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.)

NEPA was established to ensure that the environmental consequences of federal actions are incorporated into Agency decision-making processes. It establishes a process whereby the parties most affected by the impact of a proposed action are identified and their opinions are solicited. The proposed action and several alternatives are evaluated in relation to their environmental impacts, and a tentative selection of the most appropriate alternative is made. A Draft Environmental Impact Statement (DEIS) is developed that presents sufficient information to evaluate the suitability of the proposed and alternative actions. A Notice of Availability, announcing that the DEIS can be obtained for comment, is published in the *Federal Register*. After the DEIS comment period, the comments are addressed, revisions are made to the DEIS, and the document is published as a Final EIS. The Corps is the lead agency under NEPA. This document fulfills the NEPA EIS requirement.

The Council on Environmental Quality (CEQ) has published regulations at 40 CFR Parts 1500 to 1508 for implementing NEPA. U.S. EPA NEPA regulations are published at 40 CFR Part 6. The Corps regulations for implementing NEPA are published at 33 CFR Part 220.

National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.)

The purpose of the National Historic Preservation Act is to preserve and protect historic and prehistoric resources that may be damaged, destroyed, or made less available by a project. Under this Act, federal agencies are required to identify cultural or historical resources that may be affected by a project and to consult with the State Historic Preservation Officer (SHPO) when a federal action may affect cultural resources.

Since some of the disposal sites have not yet been surveyed for cultural resources, it is not known if properties potentially eligible for the National Register of Historic Places are present. If such sites were to be selected for disposal, an archaeological and historical survey of the site would provide sufficient information for determining whether a cultural resources treatment plan would be required under the National Historic Preservation Act. Consultation with the SHPO regarding the project's effects on cultural resources, including development and implementation of a treatment plan if necessary, would ensure full compliance with this statute.

Rivers and Harbors Act of 1899 (33 U.S.C. 403 et seq.)

This Act prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers. Specifically, all types of development in or over navigable waters, including bridges, dams, dikes, piers, wharves, booms, weirs, jetties, dredging, and filling are regulated by requiring a Corps permit for such actions. Navigable waters are defined in 33 CFR section 329 as those waters that are subject to the ebb and flow of the tide and/or have been used in the past, or may in the future be used to transport interstate or foreign commerce. Court decisions have expanded protection to estuaries and wetlands. This Act, read in conjunction with the Fish and Wildlife Coordination Act (16 U.S.C. 661-666) and the National Environmental Policy Act of 1969 (42 U.S.C. 4331-4347), permits the Corps to refuse on conservation grounds to grant a permit to dredge or fill in navigable waters. Section 10 of the Act prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps.

Submerged Lands Act of 1953 (Public Law 82-3167; 43 U.S.C. 1301 et seq)

This Act authorized coastal states to extend their state boundaries seaward to include "lands beneath navigable waters" to a distance of 3 miles offshore from the low tide line. Under this Act, the federal government relinquished all of its rights to lands beneath navigable waters within the 3-mile limit, and the respective states were granted ownership of all resources within these lands and waters. The federal government retained its rights and powers regarding regulation of these lands and waters for the constitutional purposes of commerce, navigation, national defense, and international affairs. As a result of this Act, that portion of the continental shelf beyond the 3-mile limit became known as the outer continental shelf (OCS). The OCS lands remain under the ownership and control of the federal government. Only the LA-2 site is located on the OCS.

U.S. Army Corps of Engineers Regulation 1105-2-50, Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies

This Corps regulation provides guidance to enhance, maintain, and restore the desirable qualities of the human and natural environment, including productivity, variety, spaciousness, and beauty. It also includes procedures for evaluating the effects of plans on environmental quality, including aesthetic attributes.

Regulatory Setting for Executive Order 12898 on Environmental Justice

This Executive Order is discussed in Section 4.8.5 of the main text (page 4.8-12).

2. State Regulations

California Clean Air Act of 1988 (Health & Safety Code, Sections 39000-44210)

The California Clean Air Act (CCAA) established a legal mandate to achieve health-based California ambient air quality standards (CAAQS) at the earliest practicable date (see Table B-1). Based on pollutant levels, the CCAA divides the state into areas in attainment or nonattainment of the CAAQS. Ozone (O_3) nonattainment areas are classified as moderate, serious, severe, or extreme, and carbon monoxide (CO) nonattainment areas are classified as moderate or serious. Progressively more stringent requirements apply depending on the classification. The state nonattainment rating system is shown in Table B-3. Similar to the federal system, this system is based on the design day concentration.

The CCAA requires areas in nonattainment of the O_3 and CO CAAQS, such as the South Coast Air Basin (SCAB), to adopt a plan that will lead to the attainment of these standards by the earliest practical date. The South Coast Air Quality Management District (SCAQMD) is required to reduce emissions of these pollutants by 5 percent annually from the 1987 emission inventory, starting in 1988, or by 15 percent averaged over a three-year period beginning in 1988. Annual emission reductions of 5 percent thereafter are required, until the CAAQS are attained. Exceptions to this 5 percent annual reduction rule are allowed only if the attainment plan contains all feasible measures to control emissions.

Severe ozone nonattainment areas, such as the location of the dredging activity, are required to implement new emission control measures. These control measures include an indirect and area source control program, application of Best Available Retrofit Control Technology (BARCT) to existing stationary sources, a modification of the permitting program to achieve no net increase of emissions from new or modified stationary sources, consideration of transportation control measures, and substantial use of low-emission motor vehicles by operators of motor vehicle fleets. The suggested transportation control measures include programs of ride-sharing, vanpooling, and flexible work hours. The goals of these programs are to achieve an average ridership during weekday commute hours of 1.5 or more persons per vehicle by 1999, no net increase in vehicle emissions after 1997, and a substantial reduction in the rate of increase of passenger vehicle trips and miles traveled per trip.

Areas in nonattainment for PM_{10}, sulfates, lead, hydrogen sulfide, or visibility are not expressly required to develop an attainment plan under the CCAA.

Table B-3
State Nonattainment Classifications

Pollutant/Classification	*Design Day Value Concentration* [a]
Ozone	
Moderate	0.09-0.12 ppm, inclusive
Serious	0.13-0.15 ppm, inclusive
Severe	0.16-0.20 ppm, inclusive
Extreme	>0.20 ppm
Carbon Monoxide	
Moderate	9.0-12.7 ppm, inclusive
Serious	> 12.7 ppm

Note: (a) Ozone data based on 1989-1991 calendar years, without regard to transport conditions. CO data based on 1989-1990 and 1990-1991 winter seasons.
Source: California Health and Safety Code Sec. 40921.5.

California Coastal Act of 1976 (Public Resources Code Section 3000 et seq.)

This Act establishes the state Coastal Zone Management Plan (CZMP), which has been approved by the U.S. Department of Commerce. All federal actions that affect the coastal zone must be determined to be as consistent as practicable with this plan (see CZMA above). The Act promotes the maintenance and enhancement of public access to the coast. Policies on recreation are addressed in sections 30220 through 30224 of the Coastal Act. The Act declares that the permanent protection of the state's natural and scenic resources is a paramount concern. Policies of the Coastal Act will apply to the dredge site and all potential disposal sites except LA-2.

California Endangered Species Act of 1984 (Fish and Game Code Section 2050 et. seq.)

The California Endangered Species Act provides for the recognition and protection of rare, threatened, and endangered species of plants and animals. The Act requires state agencies to consult with the California Department of Fish and Game (CDFG) to ensure that state-authorized or funded actions do not jeopardize the continued existence of a listed species. The Act prohibits the taking (collection, killing, or injury, whether intentional or accidental) of listed species without authorization from the CDFG. CDFG may authorize the taking of a listed species through a Memorandum of Understanding that establishes the extent of take permitted by CDFG and sets forth the required mitigation.

California Environmental Quality Act of 1970 (Public Resources Code, Sections 21000-21177)

CEQA establishes requirements similar to those of NEPA for consideration of environmental impacts and alternatives, and for preparation of an Environmental Impact Report (EIR) prior to implementation of applicable projects. CEQA, however, requires that significant environmental impacts be mitigated to a level of insignificance, or to the maximum extent feasible. If full mitigation is not feasible, the state lead agency must make a finding of overriding considerations before approving the project. The proposed action falls under the purview of the CEQA. This document fulfills the CEQA EIR requirement. The Port is the lead agency under CEQA. Responsible agencies (public agencies other than the lead agency that have responsibility for carrying out or approving a project) include the California Coastal Commission, State Lands Commission, Regional Water Quality Control Board, and the South Coast Air Quality Management District.

California Hazardous Waste Control Act of 1972 (Health & Safety Code Chapter 6.5; CCR Title 22)

If disposal of hazardous wastes becomes necessary during dredging operations, applicable requirements of Section 25100 *et seq.* of the California Hazardous Waste Control Act must be met. More detailed information concerning the implementation of these requirements is given in Title 22 of the California Code of Regulations, Chapter 30. Detailed sediment chemistry investigations are required to determine if sediments to be dredged and disposed contain toxic, corrosive, flammable, or reactive material at concentrations that exceed those defined in Article 11 of Chapter 30.

Porter-Cologne Water Quality Control Act of 1966 (California Water Code Sec. 13000 et seq.; CCR Title 23, Chapter 3, Subchapter 15)

The Porter-Cologne Act is the primary state regulation that addresses water quality. The requirements of the Act are implemented by the State Water Resources Control Board (SWRCB) at the state level and, at the local level, Regional Water Quality Control Boards (RWQCBs). Under the direction of the SWRCB, the RWQCBs carry out planning, permitting, and enforcement activities related to water quality in California. The Act provides for waste discharge requirements and a permitting system for discharges to land or water. The Act also provides for Basin plans to identify beneficial uses of water resources and to implement appropriate controls.

State Lands Commission Policies

The State Lands Commission (SLC) is responsible for administration of state public trust lands in coastal waters (within a 3-mile territorial limit) and other tidal and submerged areas. The proposed dredge site and all of the potential disposal sites except LA-2 lie within state waters. The State's interest in these lands consists of sovereign fee ownership, or a Public Trust easement implicitly retained by the State over sovereign lands sold into private ownership. Use of these lands, including dredging and dredged material disposal activities, requires written authorization from the SLC. The SLC reviews dredging projects for compliance with CEQA. In some cases, the State Legislature has granted, by statute, administration of the State's interests in filled and unfilled tidelands and submerged lands to local agencies. In these cases, SLC retains an oversight role.

3. Local Regulations

Local Noise Ordinance

The City of Long Beach Noise Ordinance allows construction activities to occur only between the hours of 7 A.M. and 7 P.M. Monday through Friday, between 7 A.M. and 6 P.M. on Saturday, and not at all on Sunday (personal communication, D. Chen 1994). No specific decibel limit is set. This regulation does not apply to noise within the Long Beach Harbor District boundaries (Municipal Code 8.80.202) (personal communication, D. Chen 1994), and the Port of Long Beach has no regulations that govern short-term construction noise. The City of Long Beach grants exemptions to projects that contribute to public health, welfare, and safety. Beach nourishment would be considered such an activity; therefore, disposal activities at beach nourishment sites under the jurisdiction of the City of Long Beach would be exempt from the hourly limitations described above (personal communication, D. Chen 1994).

South Coast Air Quality Management District Rules and Regulations

The federal Clean Air Act gives state and local agencies the authority to establish air quality rules and regulations. Rules adopted by the local air pollution control districts and accepted by the ARB are included in the State Implementation Plan. When approved by the EPA, these rules become federally enforceable. The South Coast Air Quality Management District (SCAQMD) has received the necessary approvals and has developed the *SCAQMD Rules and Regulations* to regulate stationary sources of air pollution in the SCAB. Selected rules and regulations pertinent to the project and related activities described in this document are discussed below.

Regulation I - General Provisions. This section deals with the general provisions of the *Rules and Regulations*. In particular, Rule 102 defines words and terms used in the *Rules and Regulations*, Rule 108 establishes procedures for demonstrating compliance with an emission limitation of a specific rule by means of an Alternate Emission Control Plan, and Rule 109 establishes the recordkeeping requirements for users of VOC containing materials.

Regulation II - Permitting. This section of the *Rules and Regulations* describes the requirements related to obtaining a Permit to Construct (PTC) to install or a Permit to Operate (PTO) to operate any device that controls emissions or emits air contaminants. Pertinent rules included in Regulation II are:

- Rule 212 - Standards for Approving Permits. States that a PTC or PTO shall be denied unless the applicant shows that an emission source can be operated without emitting air contaminants in violation of Sections 41700, 41701, or 44300 (*et seq.*) of the state Health and Safety Code that "cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property."

- Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II. Exempts motor vehicles and certain types of equipment from permitting requirements.

- Rule 220 - Exemptions-Net Increase in Emissions. Specifies the conditions under which the Executive Officer may exempt a source from any prohibitory rule of Regulations IV and XI.

Regulation III - Fees. The rules contained in Regulation III define the fees and fee schedule for permits, analysis, research, inventories, and plans performed or submitted to the SCAQMD.

Regulation IV - Prohibitions. This section is a collection of rules that limit contaminant concentration in fuels and in air contaminant emissions rates, and details start-up, shut-down and breakdown requirements for sources. In particular, there are three rules that could apply to project activities:

- Rule 401 - Visible Emissions. Requires that emissions from all sources remain below set visibility and opacity levels.

- Rule 403 - Fugitive Dust. Prohibits emissions of fugitive dust from any transport, handling, construction, or storage activity such that the dust remains visible beyond the emission source property line. Particulate matter (PM) concentrations shall not exceed 100 $\mu g/m^3$ when determined as the difference between upwind and downwind samples collected with high volume samplers at the property line for a minimum of 5 hours.

- Rule 431.2 - Sulfur Content of Liquid Fuels. States that on or after October 1, 1993 a person shall not burn any liquid fuel having a sulfur content in excess of 0.5 percent by weight. The rule exempts fuel used to propel on-road motor vehicles, aircraft, locomotives, or ships. As a result, the sulfur limitation would only apply to construction equipment and diesel dredges used for the project.

Regulation XI - Source Specific Standards. This section deals with the source specific standards for devices that emit air contaminants. The following rules would be applicable to project activities:

- Rule 1110.1 - Emission from Stationary Internal Combustion Engines. This rule limits the emissions from stationary internal combustion engines that burn gaseous fuels.

- Rule 1110.2 - Emission from Gaseous- and Liquid-Fueled Internal Combustion Engines. This rule requires electrification of existing engines or reductions in exhaust emissions to meet specified limits for CO, NO_x and ROGs.

Regulation XIII - New Source Review. This section sets forth pre-construction requirements for new or modified stationary sources that emit nonattainment pollutants, to ensure that the operation of such sources does not interfere with progress toward attainment of the NAAQS and CAAQS, without unnecessarily restricting future economic growth within the SCAB. A subject source must not result in emissions that interfere with the schedule of reasonable further progress toward attainment. The NSR requirements apply to sources that emit any nonattainment pollutant. In particular, Rule 1303 establishes NSR requirements that may apply to new emission sources requiring permits. These include:

- The new source or modification must use Best Available Control Technology (BACT) for each affected air pollutant and carcinogenic air toxins.

- The applicant must substantiate with modelling or other analysis that project emissions will not cause a significant increase in an air quality concentration. A significant increase is defined by pollutant and averaging times as shown in Table B-4.

- The total accumulated increase in emissions for each air pollutant at the subject source must be offset by reductions in air pollutants such that there is a net reduction in emissions.

Regulation XIV - Toxics and Other Non-Criteria Pollutants. This section establishes rules for toxic and other non-criteria pollutant emissions. In particular, Rule 1401 sets limits for maximum individual cancer risk and estimated excess cancer cases from new permit units, relocations, or modifications to existing permit units that emit any of the 50 listed carcinogenic air contaminants. The rule establishes allowable risks for all such permit units that require new permits.

Regulation XV - Trip Reduction/Indirect Source. This section details the requirements for employers that employ 100 or more persons to reduce the work related trips in single-occupancy vehicles between 6:00 and 10:00 A.M. inclusive Monday through Friday. These employers must develop and implement trip reduction programs to reduce emissions from vehicles driven for work related trips.

Table B-4
SCAQMD Maximum Allowable Concentration Increases

Air Contaminant	*Averaging Time*	*Significant Increase in Air Quality Concentration*	
Nitrogen Dioxide	1 Hour	0.1 pphm	20.0 $\mu g/m^3$
	Annual	0.05 pphm	1.0 $\mu g/m^3$
Carbon Monoxide	1 Hour	1.0 pphm	1.1 mg/m^3
	8 Hour	0.45 pphm	0.50 mg/m^3
PM_{10}	24 Hour	--	2.5 $\mu g/m^3$
	Annual Geometric Mean	--	1.0 $\mu g/m^3$
Sulfate	24 Hour	--	1.0 $\mu g/m^3$

Source: SCAQMD Rules and Regulations, 1994

Regulation XVII - Prevention of Significant Deterioration (PSD). This sections applies the Federal PSD requirements to the SCAB and provides for the regulation of new or modified major stationary sources of air pollution so that these sources are constructed without significant adverse deterioration of clean air areas. Since the SCAB is in attainment for SO_2, an increase in SO_2 emissions greater than 25 tons/year would require a PSD analysis.

Air Quality Management Plan

The CAA requires each state that has not attained the NAAQS to prepare a plan detailing how these standards will be met in each local area of the state. These plans are prepared by local agencies designated by the legislature of each state and incorporated into a SIP. In conformance with these requirements, the local SCAQMD and the Southern California Association of Governments (SCAG) developed an *Air Quality Management Plan* (AQMP) to demonstrate attainment of the NAAQS. An AQMP was first developed for the SCAB in 1979 and revised in 1982. The 1982 AQMP revision was required to demonstrate progress toward attainment of the O_3 and CO NAAQS, but was unable to show compliance with these standards by 1987 and was disapproved by the EPA. As a result, the SCAQMD and SCAG developed the 1989 AQMP that demonstrated attainment by 2007 for all federal and state standards with the exceptions of the state standards for O_3 and PM_{10}. This plan contained short- and long-range emission control strategies, and was partially approved by EPA as the SCAB portion of the California State Implementation Plan. At the same time that preparation of the 1989 AQMP was underway, the California Legislature passed the CCAA that requires all basins in the state to develop new attainment plans to meet both the NAAQS and the CAAQS. In addition, the CCAA places a number of performance tests before each plan. The CCAA therefore caused the SCAQMD and SCAG to immediately begin updating the plan. SCAQMD and SCAG updated the 1989 AQMP into the 1991 AQMP. The 1991 AQMP demonstrated the attainment of all NAAQS, responded positively to CCAA performance tests, dealt with the issue of global climate change, addressed the stratospheric ozone depletion problem, and evaluated the problem of air toxics.

The 1990 CAA identifies specific emission reduction goals, requires both a demonstration of reasonable further progress and an attainment demonstration, and incorporates more stringent sanctions for failure to attain or to meet interim milestones. The 1994 revision to the AQMP addresses these requirements. Included in the 1994 AQMP are: (1) use of most current air quality information (1993); (2) improved emissions inventories; (3) revised overall control strategy with greater emphasis on alternative approaches; (4) new control measures as well as updated and refined control measures carried over from the 1991 AQMP; (5) additional market-incentive control measures; (6) enhanced photochemical modeling; (7) amendments to the federal Reactive Organic Compound (ROC) Rate-of-Progress Plan and the Federal Attainment Plans for NO_2 and CO; and (8) the federal post-1996 Rate-of-Progress demonstration, Best Available Control Measure (BACM) PM_{10} Plan, and ozone attainment demonstration.

Progress toward attainment is demonstrated in the AQMP by implementing control measures defined in the AQMP and by showing a decrease in future SCAB emission inventories. The emissions from an individual project, when combined with the total SCAB emissions for each source category, must remain below the forecasted emission levels, to show consistency with the AQMP.

APPENDIX C

Air Emissions Data and Calculations

Short-Term Emissions

It was determined from information supplied by the Corps that the 3,600 cubic yard hopper dredge could remove 2,100 cubic yards of material per hour and would have an effective capacity of 1,620 cubic yards of dredged material. The remaining 1,980 cubic yards of capacity would be filled by water. The dredge was assumed to need 20 minutes for maneuvering and 15 minutes for bottom dumping the dredged material at the placement site. The time required to transport the dredge material was calculated by dividing the distance between the dredge site and the placement site by the dredge speed. The dredge was assumed to travel at eight miles per hour on the trip to the placement site and 9 miles per hour on the trip back from the placement site, except for the LA-2 site. For the more distant LA-2 site, the dredge speed to and from the site was increased to 10 and 11 miles per hour, respectively. The times spent during each mode of dredging and transporting were then summed to obtain a total dredge time per load.

To obtain the number of loads per day that could be dredged, an "availability time" was needed. To account for bad weather, crew changes, and other inefficiencies in operations, the total number of hours in the day was reduced by 32 percent to obtain a dredge availability time. This availability time was then divided by the total dredge time per load to obtain the number of loads that would be dredged and disposed of during an average day. The number of total trips necessary for each placement option was found by dividing the capacity of the placement site by the effective capacity of the hopper dredge. The total duration of the dredging and transporting associated with each placement option was determined by dividing the number of trips necessary by the number of loads the dredge could move in a day.

Emissions from the dredge and support equipment were calculated using the following methodology. The daily fuel consumption for each mode and piece of equipment was found by multiplying the number of loads the equipment could dredge and dispose of per day, the duration of the mode, and the hourly fuel consumption. The daily fuel consumption for each mode and piece of equipment was then multiplied by the specific emission factor to determine the daily emissions. The total placement option emissions were calculated by multiplying the daily emissions for each mode and piece of equipment by the number of days required under the particular placement option.

For employee commuting, the single employee daily emissions were calculated by multiplying the commute distance by an emission factor and adding emission factors to account for emissions from diurnal events (e.g., a motor vehicle sitting for a 6 to 8 hour period without operating), two cold starts (motor vehicle not warmed up), and two hot soaks (just after shutting a motor vehicle off, there are some residual emissions). The daily emissions were obtained by multiplying the single employee emissions by the number of employees. The total placement option emissions were calculated by multiplying the daily commuter emissions by the number of days required for the particular placement option.

The construction source data used in estimating the emissions from the Queen's Gate deepening project are shown in Tables C-1 and C-2. The construction equipment emission factors used are provided in Table C-3, while the employee commuting emission factors used are presented in Table C-4. The daily and total emissions associated with each placement option are presented in Tables C-5 and C-6, respectively. The mitigated daily emissions associated with each potential placement option are shown in Table C-7. The mitigated total emissions for each potential placement option are shown in Table C-8.

Long-Term Emissions

Operational emissions are based upon vessel activities within the SCAB to Berth T121 after the Queen's Gate approach channel is deepened. These activities would include cruising in and out of the POLB, tug assisted maneuvering in and out of the berth, hoteling at the berth, and bunkering of fuel. Annual ship visits, supplied by the Corps, are presented in Table C-9.

Emissions from vessel activities, except bunkering, were calculated by multiplying the length of time a ship would be in that mode by the fuel consumption rate for the mode, and by a mode specific emission factor. The methodologies use to determine the time in mode and the fuel consumption per mode are presented in detail below for each mode. The emission factors from Port Emissions Vessel Model (PVEM) (DOT 1986) are shown in Table C-10.

CRUISING EMISSIONS

To obtain the time a ship would cruise in SCAQMD jurisdictional waters, the estimated distance traveled was divided by the estimated cruising speed of 15.5 knots. The estimated distances are based upon the travel mix data for vessels cruising in SCAQMD jurisdictional waters, as taken from the Booz, Allen & Hamilton (1991) report, ***Inventory of Air Pollutant Emissions from Marine Vessels***. The nautical distance traveled is based on the California sealane vectors and is assumed to be 36.5 nautical miles for Long Beach North, 26 nautical miles for Long Beach South, and 32.1 nautical miles for Long Beach West. These values are from the 1988 SCAQMD Engineering Division Report on ***Area Source Methodology for Emissions from Combustion of Fuels by Seagoing Vessels in SCAQMD Territorial Waters and Harbors*** (SCAQMD 1989). It was assumed that fuel would be consumed at 80 percent of full power fuel usage. Emissions from vessels cruising in SCAQMD jurisdictional waters are presented in Table C-11.

MANEUVERING EMISSIONS

It was assumed that a vessel would require 48 minutes at half speed and 36 minutes at slow speed to maneuver into or out of a berth. At half speed, the vessel was assumed to consume fuel at 40 percent of full power fuel usage, and at slow speed, 10 percent of full power fuel usage (DOT 1986). In addition, two twin-engine tugboats were assumed to assist the vessel for one hour on the in-bound leg and one-half hour on the out-bound leg. Each engine on the tugboat was assumed to be rated at 2,150 hp and to operate at two-thirds power (Shell Oil Co. 1990). The emissions from vessels maneuvering are presented in Table C-12.

HOTELING EMISSIONS

The duration for hoteling was calculated as the time from arrival to departure minus the time spent maneuvering in or out of the Port. Fuel is consumed at a rate of 20 percent of full power fuel usage during hoteling. In addition to hoteling emissions, emissions from bunkering of fuel were considered. Emissions from bunkering were taken from the ***Phase I 2020 Plan DEIR/S*** (COE, POLA, and POLB 1990). All ships were assumed to load 40,000 gallons of #2 diesel fuel and 175,000 gallons of #6 or bunker C fuel oil. In loading the fuel, the tug-towed barge serving the ship would emit 56 lbs of CO, 267.1 lbs of NO_x, 17.8 lbs of PM_{10}, 22.4 lbs of ROC, and 18.2 lbs of SO_x. Emissions from ships hoteling at the Port of Long Beach are shown in Table C-13.

Emissions for each mode of operation, tugboats, and bunkering of fuel were summed to obtain total ship emissions per ship visit for each size of ship. These emissions are presented in Table C-14. Total annual emissions were then estimated by multiplying the per-visit emissions for each ship size by the number of ships of that size that had visited or would visit the Port. Total baseline emissions are presented in Table C-15, and the emissions from ships affected by the project are presented in Table C-16. Emissions from the no-action alternative are shown in Table C-17.

Table C-1

Construction Source Data for the Queen's Gate Entrance Channel Deepening Project

Mode/Equipment	*Power Rating (HP)*	*Load Factor %*	*Fuel Usage (Gal/Hr)*
Dredging			
Propulsion	3,000	10	15.0
Jet Pumps	565	75	21.2
Dredge Pumps	1,700	80	68.0
Auxiliary & Misc.	2,265	50	56.6
Transporting			
Propulsion	3,000	85	127.5
Jet Pumps	565	0	0.0
Dredge Pumps	1,700	0	0.0
Auxiliary & Misc.	2,265	25	28.3
Support Launches (2)	NA	NA	11.0
Employee Commuting (a)	20	15	600

Note: (a) For this source, Power Rating is number of employees, Load Factor is the average one-way commute distance in miles, and Fuel Usage is the total daily mileage.

Source: Personal communication, B. Williams 1995.

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Table C-2

Construction Source Data for the Queen's Gate Entrance Channel Deepening Project

Mode/Placement Option	*Distance to Pit (Miles)*	*Time in Mode (Minutes)*	*Loads/Day*	*Number of Days*
Dredging	NA	46.29	NA	NA
Transporting				
Landfill in the POLA	4.2	94.50	6.96	178
Main Channel Pit	2.1	64.75	8.82	147
Energy Island North Pit	3.57	85.58	7.43	466
Energy Island Southeast Pit	3.65	86.71	7.36	126
LA-2	8.7	134.65	5.41	639

Table C-3

Construction Equipment Emission Factors for the Queen's Gate Entrance Channel Deepening Project

Equipment Type	Fuel Type	Emission Factors (Pounds/1000 Gallons)					Source
		CO	NOx	PM10	ROC	SOx	
Propulsion Engines	D	70.20	407.50	31.68	43.87	28.50	(a)
Jet Pumps Engines	D	102.00	469.00	16.75	32.10	31.20	(b)
Dredge Pumps Engines	D	102.00	469.00	16.75	32.10	31.20	(b)
Auxiliary & Misc. Engines	D	102.00	469.00	16.75	32.10	31.20	(b)
Launch Boat	D	70.20	407.50	31.68	43.87	28.50	(a)

Note: (a) ARB (1984), except SO2 and PM10 from Scott Environmental Technology (1981).
(b) Table A9-3-B from SCAQMD (1993) CEQA Air Quality Handbook.

Table C-4

Employee Commuting Emission Factors for the Queen's Gate Entrance Channel Deepening Project

Mode	Emission Factors (Grams/Mile)				
	CO	NOx	PM10	ROC	SOx
Running (25 mph)	5.46	0.58	0.105	0.38	0.06
Cold Start (a)	74.82	2.40	0.000	4.11	0.00
Hot Start (a)	9.49	1.26	0.000	0.92	0.00
Hot Soak (a)	0.00	0.00	0.000	0.94	0.00
Diurnal (b)	0.00	0.00	0.000	2.63	0.00

Source: Tables A9-5-J-4 and A9-5-L from SCAQMD (1993) CEQA Air Quality Handbook.

Note: (a) Emission factors are in grams/start.
(b) Emission factors are in grams/day.

Table C-5

Daily Dredging and Placement Emissions
(page 1 of 2)

Placement Option/ Emission Source	*Daily Emissions (Lbs/Day)* CO	NOx	PM10	ROC	SOx
Landfill in the POLA					
Dredging					
Propulsion	5.6	32.8	2.5	3.5	2.3
Jet Pumps	11.6	53.3	1.9	3.6	3.5
Dredge Pumps	37.2	171.1	6.1	11.7	11.4
Auxiliary & Misc.	31.0	142.5	5.1	9.8	9.5
Dredging Total	85.4	399.7	15.7	28.6	26.7
Transporting					
Propulsion	98.0	569.2	44.2	61.3	39.8
Auxiliary & Misc.	31.6	145.5	5.2	10.0	9.7
Transporting Total	129.7	714.6	49.4	71.2	49.5
Support Launch	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	247.5	1,222.9	73.6	112.5	83.8
Main Channel Borrow Pit					
Dredging					
Propulsion	7.2	41.6	3.2	4.5	2.9
Jet Pumps	14.7	67.6	2.4	4.6	4.5
Dredge Pumps	47.2	217.0	7.7	14.8	14.4
Auxiliary & Misc.	39.3	180.7	6.5	12.4	12.0
Dredging Total	108.3	506.8	19.8	36.3	33.9
Transporting					
Propulsion	85.2	494.5	38.4	53.2	34.6
Auxiliary & Misc.	27.5	126.4	4.5	8.6	8.4
Transporting Total	112.7	620.8	43.0	61.9	43.0
Support Launch	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	253.4	1,236.2	71.3	110.8	84.5
Energy Island North Borrow Pit					
Dredging					
Propulsion	6.0	35.0	2.7	3.8	2.4
Jet Pumps	12.4	56.9	2.0	3.9	3.8
Dredge Pumps	39.7	182.7	6.5	12.5	12.2
Auxiliary & Misc.	33.1	152.1	5.4	10.4	10.1
Dredging Total	91.2	426.8	16.7	30.6	28.5
Transporting					
Propulsion	108.7	631.0	49.1	67.9	44.1
Auxiliary & Misc.	35.1	161.3	5.8	11.0	10.7
Transporting Total	143.8	792.3	54.8	79.0	54.9
Support Launch	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	267.4	1,327.6	80.0	122.2	91.0

Table C-5

Daily Dredging and Placement Emissions
(page 2 of 2)

Placement Option/ Emission Source	*Daily Emissions (Lbs/Day)*				
	CO	*NOx*	*PM10*	*ROC*	*SOx*
Energy Island Southeast Borrow Pit					
Dredging					
Propulsion	6.0	34.7	2.7	3.7	2.4
Jet Pumps	12.3	56.4	2.0	3.9	3.8
Dredge Pumps	39.4	181.1	6.5	12.4	12.1
Auxiliary & Misc.	32.8	150.8	5.4	10.3	10.0
Dredging Total	90.5	423.1	16.6	30.3	28.3
Transporting					
Propulsion	95.2	552.8	43.0	59.5	38.7
Auxiliary & Misc.	30.7	141.3	5.0	9.7	9.4
Transporting Total	126.0	694.1	48.0	69.2	48.1
Support Launch	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	248.8	1,225.8	73.1	112.2	83.9
LA-2					
Dredging					
Propulsion	4.4	25.5	2.0	2.7	1.8
Jet Pumps	9.0	41.5	1.5	2.8	2.8
Dredge Pumps	29.0	133.1	4.8	9.1	8.9
Auxiliary & Misc.	24.1	110.9	4.0	7.6	7.4
Dredging Total	66.5	311.0	12.2	22.3	20.8
Transporting					
Propulsion	108.7	631.0	49.1	67.9	44.1
Auxiliary & Misc.	35.1	161.3	5.8	11.0	10.7
Transporting Total	143.8	792.3	54.8	79.0	54.9
Support Launch	18.5	107.6	8.4	11.6	7.5
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	242.6	1,211.9	75.5	113.9	83.2

Table C-6

Total Dredging and Placement Emissions
(page 1 of 2)

Placement Option/ Emission Source	*Total Emissions (Tons)* CO	NOx	PM10	ROC	SOx
Landfill in the POLA					
Dredging					
Propulsion	0.50	2.92	0.23	0.31	0.20
Jet Pumps	1.03	4.75	0.17	0.32	0.32
Dredge Pumps	3.31	15.23	0.54	1.04	1.01
Auxiliary & Misc.	2.76	12.68	0.45	0.87	0.84
Dredging Total	7.61	35.58	1.39	2.55	2.38
Transporting					
Propulsion	8.73	50.65	3.94	5.45	3.54
Auxiliary & Misc.	2.82	12.95	0.46	0.89	0.86
Transporting Total	11.54	63.60	4.40	6.34	4.40
Support Launch	1.65	9.57	0.74	1.03	0.67
Employee Commuting	1.23	0.09	0.01	0.09	0.01
Option Total	22.03	108.84	6.55	10.01	7.46
Main Channel Borrow Pit					
Dredging					
Propulsion	0.53	3.06	0.24	0.33	0.21
Jet Pumps	1.08	4.97	0.18	0.34	0.33
Dredge Pumps	3.47	15.95	0.57	1.09	1.06
Auxiliary & Misc.	2.89	13.28	0.47	0.91	0.88
Dredging Total	7.96	37.25	1.46	2.67	2.49
Transporting					
Propulsion	6.26	36.34	2.83	3.91	2.54
Auxiliary & Misc.	2.02	9.29	0.33	0.64	0.62
Transporting Total	8.28	45.63	3.16	4.55	3.16
Support Launch	1.36	7.91	0.61	0.85	0.55
Employee Commuting	1.02	0.07	0.01	0.08	0.01
Option Total	18.62	90.86	5.24	8.15	6.21
Energy Island North Borrow Pit					
Dredging					
Propulsion	1.41	8.16	0.63	0.88	0.57
Jet Pumps	2.88	13.26	0.47	0.91	0.88
Dredge Pumps	9.26	42.57	1.52	2.91	2.83
Auxiliary & Misc.	7.71	35.45	1.27	2.43	2.36
Dredging Total	21.26	99.44	3.89	7.13	6.64
Transporting					
Propulsion	25.33	147.03	11.43	15.83	10.28
Auxiliary & Misc.	8.17	37.58	1.34	2.57	2.50
Transporting Total	33.50	184.60	12.77	18.40	12.78
Support Launch	4.32	25.07	1.95	2.70	1.75
Employee Commuting	3.22	0.23	0.03	0.25	0.02
Option Total	62.30	309.34	18.65	28.47	21.20

Table C-6

Total Dredging and Placement Emissions
(page 2 of 2)

Placement Option/ Emission Source	*Total Emissions (Tons)* CO	NOx	PM10	ROC	SOx
Energy Island Southeast Borrow Pit					
Dredging					
Propulsion	0.38	2.19	0.17	0.24	0.15
Jet Pumps	0.77	3.56	0.13	0.24	0.24
Dredge Pumps	2.48	11.41	0.41	0.78	0.76
Auxiliary & Misc.	2.07	9.50	0.34	0.65	0.63
Dredging Total	5.70	26.66	1.04	1.91	1.78
Transporting					
Propulsion	6.00	34.83	2.71	3.75	2.44
Auxiliary & Misc.	1.94	8.90	0.32	0.61	0.59
Transporting Total	7.94	43.73	3.03	4.36	3.03
Support Launch	1.17	6.78	0.53	0.73	0.47
Employee Commuting	0.87	0.06	0.01	0.07	0.01
Option Total	15.67	77.23	4.61	7.07	5.29
LA-2					
Dredging					
Propulsion	1.40	8.15	0.63	0.88	0.57
Jet Pumps	2.88	13.25	0.47	0.91	0.88
Dredge Pumps	9.25	42.54	1.52	2.91	2.83
Auxiliary & Misc.	7.70	35.42	1.27	2.42	2.36
Dredging Total	21.24	99.37	3.89	7.12	6.64
Transporting					
Propulsion	34.73	201.61	15.67	21.71	14.10
Auxiliary & Misc.	11.21	51.53	1.84	3.53	3.43
Transporting Total	45.94	253.14	17.51	25.23	17.53
Support Launch	5.92	34.37	2.67	3.70	2.40
Employee Commuting	4.42	0.31	0.04	0.34	0.03
Option Total	77.52	387.19	24.12	36.39	26.60

Table C-7

Mitigated Daily Dredging and Placement Emissions
(page 1 of 2)

Placement Option/ Emission Source	Daily Emissions (Lbs/Day)				
	CO	NOx	PM10	ROC	SOx
Landfill in the POLA					
Dredging					
Propulsion	5.6	27.9	2.5	3.0	0.6
Jet Pumps	11.6	45.3	1.9	3.1	0.9
Dredge Pumps	37.2	145.4	6.1	10.0	2.8
Auxiliary & Misc.	31.0	121.1	5.1	8.3	2.4
Dredging Total	85.4	339.8	15.7	24.3	6.7
Transporting					
Propulsion	98.0	483.8	44.2	52.1	10.0
Auxiliary & Misc.	31.6	123.6	5.2	8.5	2.4
Transporting Total	129.7	607.4	49.4	60.5	12.4
Support Launch	18.5	91.4	8.4	9.8	1.9
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	247.5	1,039.6	73.6	95.8	21.0
Main Channel Borrow Pit					
Dredging					
Propulsion	7.2	35.3	3.2	3.8	0.7
Jet Pumps	14.7	57.5	2.4	3.9	1.1
Dredge Pumps	47.2	184.4	7.7	12.6	3.6
Auxiliary & Misc.	39.3	153.6	6.5	10.5	3.0
Dredging Total	108.3	430.8	19.8	30.9	8.5
Transporting					
Propulsion	85.2	420.3	38.4	45.2	8.6
Auxiliary & Misc.	27.5	107.4	4.5	7.4	2.1
Transporting Total	112.7	527.7	43.0	52.6	10.7
Support Launch	18.5	91.4	8.4	9.8	1.9
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	253.4	1,050.9	71.3	94.4	21.2
Energy Island North Borrow Pit					
Dredging					
Propulsion	6.0	29.8	2.7	3.2	0.6
Jet Pumps	12.4	48.4	2.0	3.3	0.9
Dredge Pumps	39.7	155.3	6.5	10.6	3.0
Auxiliary & Misc.	33.1	129.3	5.4	8.9	2.5
Dredging Total	91.2	362.8	16.7	26.0	7.1
Transporting					
Propulsion	108.7	536.4	49.1	57.7	11.0
Auxiliary & Misc.	35.1	137.1	5.8	9.4	2.7
Transporting Total	143.8	673.4	54.8	67.1	13.7
Support Launch	18.5	91.4	8.4	9.8	1.9
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	267.4	1,128.6	80.0	104.0	22.8

Table C-7

Mitigated Daily Dredging and Placement Emissions
(page 2 of 2)

Placement Option/	*Daily Emissions (Lbs/Day)*				
Emission Source	*CO*	*NOx*	*PM10*	*ROC*	*SOx*
Energy Island Southeast Borrow Pit					
Dredging					
Propulsion	6.0	29.5	2.7	3.2	0.6
Jet Pumps	12.3	48.0	2.0	3.3	0.9
Dredge Pumps	39.4	154.0	6.5	10.5	3.0
Auxiliary & Misc.	32.8	128.2	5.4	8.8	2.5
Dredging Total	90.5	359.7	16.6	25.8	7.1
Transporting					
Propulsion	95.2	469.9	43.0	50.6	9.7
Auxiliary & Misc.	30.7	120.1	5.0	8.2	2.3
Transporting Total	126.0	590.0	48.0	58.8	12.0
Support Launch	18.5	91.4	8.4	9.8	1.9
Employee Commuting	13.82	0.98	0.14	1.06	0.08
Daily Total	248.8	1,042.1	73.1	95.5	21.0
LA-2					
Dredging					
Propulsion	4.4	21.7	2.0	2.3	0.4
Jet Pumps	9.0	35.3	1.5	2.4	0.7
Dredge Pumps	29.0	113.2	4.8	7.7	2.2
Auxiliary & Misc.	24.1	94.2	4.0	6.5	1.8
Dredging Total	66.5	264.4	12.2	18.9	5.2
Transporting					
Propulsion	108.7	536.4	49.1	57.7	11.0
Auxiliary & Misc.	35.1	137.1	5.8	9.4	2.7
Transporting Total	143.8	673.4	54.8	67.1	13.7
Support Launch	18.5	91.4	8.4	9.8	1.9
Employee Commuting	13.8	1.0	0.1	1.1	0.1
Daily Total	242.6	1,030.2	75.5	97.0	20.9

Table C-8

Mitigated Total Dredging and Placement Emissions
(page 1 of 2)

Placement Option/ Emission Source	*Total Emissions (Tons)* CO	NOx	PM10	ROC	SOx
Landfill in the POLA					
Dredging					
Propulsion	0.50	2.48	0.23	0.27	0.05
Jet Pumps	1.03	4.03	0.17	0.28	0.08
Dredge Pumps	3.31	12.94	0.54	0.89	0.25
Auxiliary & Misc.	2.76	10.78	0.45	0.74	0.21
Dredging Total	7.61	30.24	1.39	2.17	0.59
Transporting					
Propulsion	8.73	43.06	3.94	4.64	0.89
Auxiliary & Misc.	2.82	11.00	0.46	0.75	0.22
Transporting Total	11.54	54.06	4.40	5.39	1.10
Support Launch	1.65	8.14	0.74	0.88	0.17
Employee Commuting	1.23	0.09	0.01	0.09	0.01
Option Total	22.03	92.53	6.55	8.53	1.87
Main Channel Borrow Pit					
Dredging					
Propulsion	0.53	2.60	0.24	0.28	0.05
Jet Pumps	1.08	4.22	0.18	0.29	0.08
Dredge Pumps	3.47	13.55	0.57	0.93	0.27
Auxiliary & Misc.	2.89	11.29	0.47	0.77	0.22
Dredging Total	7.96	31.66	1.46	2.27	0.62
Transporting					
Propulsion	6.26	30.89	2.83	3.33	0.64
Auxiliary & Misc.	2.02	7.90	0.33	0.54	0.15
Transporting Total	8.28	38.79	3.16	3.87	0.79
Support Launch	1.36	6.72	0.61	0.72	0.14
Employee Commuting	1.02	0.07	0.01	0.08	0.01
Option Total	18.62	77.24	5.24	6.94	1.56
Energy Island North Borrow Pit					
Dredging					
Propulsion	1.41	6.93	0.63	0.75	0.14
Jet Pumps	2.88	11.27	0.47	0.77	0.22
Dredge Pumps	9.26	36.18	1.52	2.48	0.71
Auxiliary & Misc.	7.71	30.13	1.27	2.06	0.59
Dredging Total	21.26	84.52	3.89	6.06	1.66
Transporting					
Propulsion	25.33	124.97	11.43	13.45	2.57
Auxiliary & Misc.	8.17	31.94	1.34	2.19	0.62
Transporting Total	33.50	156.91	12.77	15.64	3.20
Support Launch	4.32	21.31	1.95	2.29	0.44
Employee Commuting	3.22	0.23	0.03	0.25	0.02
Option Total	62.30	262.97	18.65	24.24	5.31

Table C-8

Mitigated Total Dredging and Placement Emissions
(page 2 of 2)

Placement Option/ Emission Source	*Total Emissions (Tons)*				
	CO	*NOx*	*PM10*	*ROC*	*SOx*
Energy Island Southeast Borrow Pit					
Dredging					
Propulsion	0.38	1.86	0.17	0.20	0.04
Jet Pumps	0.77	3.02	0.13	0.21	0.06
Dredge Pumps	2.48	9.70	0.41	0.66	0.19
Auxiliary & Misc.	2.07	8.08	0.34	0.55	0.16
Dredging Total	5.70	22.66	1.04	1.62	0.45
Transporting					
Propulsion	6.00	29.60	2.71	3.19	0.61
Auxiliary & Misc.	1.94	7.57	0.32	0.52	0.15
Transporting Total	7.94	37.17	3.03	3.71	0.76
Support Launch	1.17	5.76	0.53	0.62	0.12
Employee Commuting	0.87	0.06	0.01	0.07	0.01
Option Total	15.67	65.65	4.61	6.02	1.33
LA-2					
Dredging					
Propulsion	1.40	6.93	0.63	0.75	0.14
Jet Pumps	2.88	11.27	0.47	0.77	0.22
Dredge Pumps	9.25	36.16	1.52	2.47	0.71
Auxiliary & Misc.	7.70	30.11	1.27	2.06	0.59
Dredging Total	21.24	84.46	3.89	6.05	1.66
Transporting					
Propulsion	34.73	171.37	15.67	18.45	3.53
Auxiliary & Misc.	11.21	43.80	1.84	3.00	0.86
Transporting Total	45.94	215.17	17.51	21.45	4.38
Support Launch	5.92	29.22	2.67	3.15	0.60
Employee Commuting	4.42	0.31	0.04	0.34	0.03
Option Total	77.52	329.16	24.12	30.99	6.67

Table C-9

Annual Ship Visits for the Queen's Gate Channel Deepening Project

	Ship Visits/Year		
Size *(1000 DWT)*	*Baseline* *1994*	*Proposed Action* *2010*	*No-Action* *2010*
200	50	10	45
265	30	22	29
300	0	9	0
325	0	2	0
365	0	9	0
Total	80	52	74

Source: Personal communication, B. Williams 1995.

Table C-10

Emissions Factors for Tankers and Tug Boats

% Sulfur in Fuel	*Operating Mode*	Emission Factors (Lbs/1000 Gals)				
		CO	*NOx*	*PM10*	*ROC*	*SOx*
2.5	Cruise	7	64	26.9	0.1	392.5
2.5	Transit	7	64	26.9	0.1	392.5
1.5	Maneuvering	3	56	17.3	1.0	235.5
1.5	Hoteling	0	36.4	9.6	3.2	238.5
—	Tug Boat	126.5	326.2	14.4	14.7	167.2

Source: Port Vessel Emission Model (PVEM) (DOT 1986).

Table C-11

Emissions from Ships Cruising in SCAQMD Waters

Ship Size (1000 DWT)	*Full Power Fuel Usage (Gal/Hr)*	*Total Fuel Usage (Gals)*	Cruising Emissions (Lbs/Ship Visit) *CO*	*NOx*	*PM10*	*ROC*	*SOx*
200	2,009	6,700	46.9	428.8	180.1	0.7	2,629.9
265	2,300	7,671	53.7	490.9	206.2	0.8	3,010.9
300	2,358	7,866	55.1	503.4	211.4	0.8	3,087.2
325	2,400	8,005	56.0	512.3	215.2	0.8	3,141.8
365	2,467	8,227	57.6	526.5	221.1	0.8	3,229.1

Fuel usage based upon the following assumptions:

1) Cruising requires 80% of full throttle. This assumption and Full Power-Usage data in table are from DOT (1986).
2) 13% of the ships arrive from the north, while 63% depart to the north.
3) 32% of the ships arrive from the south, while 16% depart to the south.
4) 55% of the ships arrive from the west, while 21% depart to the west.
5) Ships will travel 36.5 nm to the north, 26 nm to the south and 32.1 nm to the west.
6) Ships will travel the 64.62 nm average distance at a speed of 15.5 knots.

Source: SCAQMD 1989.

Table C-12

Emissions from Ships Maneuvering into and out of the Port of Long Beach

Ship Size (1000 DWT)	Fuel Usage — Power *Half (Gal)*	*Slow (Gal)*	*Total(a) (Gal)*	Maneuvering Emissions (Lbs/Ship Visit) *CO*	*NOx*	*PM10*	*ROC*	*SOx*
200	1,286	241	1,527	4.6	85.5	26.4	1.5	359.6
265	1,472	276	1,748	5.2	97.9	30.2	1.7	411.7
300	1,509	283	1,792	5.4	100.4	31.0	1.8	422.1
325	1,536	288	1,824	5.5	102.1	31.5	1.8	429.6
365	1,579	296	1,875	5.6	105.0	32.4	1.9	441.5
Tug boat (b)			77	9.7	25.1	1.1	1.1	12.9

a) Ships were assumed to require 48 minutes at 40% of full power and 36 minutes at 10% of full power to maneuver in or out of the berth.

b) Tug boats were assumed to operate at 2/3 power for 1.5 hours for each ship visit.

Table C-13

Emissions from Ships Hoteling in the Port of Long Beach

Ship Size (1000 DWT)	*Mean Days/Call (Days)*	*Hoteling Time (Hrs)*	*Fuel Consumption (Gal)*	*Hoteling Emissions (Lbs/Ship Visit)*				
				CO	*NOx*	*PM10*	*ROC*	*SOx*
200	2.2	50.0	20,090	0.0	731.3	192.9	64.3	4,791.5
265	2.2	50.0	23,000	0.0	837.2	220.8	73.6	5,485.5
300	2.2	50.0	23,583	0.0	858.4	226.4	75.5	5,624.6
325	2.2	50.0	24,000	0.0	873.6	230.4	76.8	5,724.0
365	2.2	50.0	24,667	0.0	897.9	236.8	78.9	5,883.0
Bunkering Emissions				56.0	267.1	17.8	22.4	18.2

Fuel usage based upon the following assumptions:
1) Hoteling time is equal to mean days/call minus maneuvering time.
2) Fuel consumption is based on hoteling engine load of 20% of full power (DOT 1986).
3) Bunkering emissions, mean days/call, and hoteling time are from COE, POLA, and POLB (1990).

Table C-14

Total Ship Emissions Per Visit at the Port of Long Beach

Ship Size (1000 DWT)	*Total Emissions (Lbs/Ship Visit)*				
	CO	*NOx*	*PM10*	*ROC*	*SOx*
200	127	1,563	419	91	7,825
265	134	1,743	477	101	8,952
300	136	1,780	489	103	9,178
325	137	1,805	497	104	9,339
365	139	1,847	510	106	9,597

Table C-15

Total Annual Baseline Ship Emissions

Ship Size (1000 DWT)	*Annual Ship Emissions (Lbs/Year)*				
	CO	*NOx*	*PM10*	*ROC*	*SOx*
200	6,348	78,147	20,969	4,557	391,246
265	4,033	52,301	14,317	3,023	268,559
300	0	0	0	0	0
325	0	0	0	0	0
365	0	0	0	0	0
Total	10,381	130,448	35,285	7,581	659,805
Total (Tons/Year)	5.19	65.22	17.64	3.79	329.90

Table C-16

Total Annual Ship Emissions under the Proposed Action

Ship Size (1000 DWT)	*Annual Emissions (Lbs/Year)*				
	CO	*NOx*	*PM10*	*ROC*	*SOx*
200	1,270	15,629	4,194	911	78,249
265	2,957	38,354	10,499	2,217	196,944
300	1,223	16,016	4,399	924	82,601
325	274	3,611	994	208	18,679
365	1,248	16,620	4,593	957	86,377
Total	6,972	90,230	24,679	5,218	462,850
Total (Tons/Year)	3.49	45.12	12.34	2.61	231.42
Change over Baseline (Tons/Year)	-1.70	-20.11	-5.30	-1.18	-98.48
Change over No-Action (Tons/Year)	-1.32	-15.33	-4.02	-0.90	-74.44

Table C-17

Total Annual Ship Emissions under the No-Action Alternative

Ship Size (1000 DWT)	*Annual Emissions (Lbs/Year)*				
	CO	*NOx*	*PM10*	*ROC*	*SOx*
200	5,713	70,332	18,872	4,102	352,121
265	3,898	50,558	13,839	2,923	259,607
300	0	0	0	0	0
325	0	0	0	0	0
365	0	0	0	0	0
Total	9,612	120,890	32,711	7,024	611,729
Total (Tons/Year)	4.81	60.45	16.36	3.51	305.86

Appendix D

THE EVALUATION OF THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIAL INTO THE WATERS OF THE UNITED STATES

I INTRODUCTION. The following evaluation is provided in accordance with Section 404(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), as amended by the Clean Water Act of 1977 (Public Law 95-217). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredged or fill material into the waters of the U.S. As such, it is not meant to stand alone and relies heavily upon information provided in the environmental document to which it is attached. Citation in brackets [] refer to expanded discussion found in the Environmental Impact Statement/Report (EIS/R), to which the reader should refer for details.

II PROJECT DESCRIPTION.

a. Location/General Description [2.1]: The U.S. Army Corps of Engineers, Los Angeles District (LAD) and the Port of Long Beach (POLB) propose to deepen and modify the main approach channel to the Port from the Queen's Gate entrance out to approximately the 76-foot mean lower low water (MLLW) contour. The proposed project area is located in the City of Long Beach, Los Angeles County, California, and is identified on Figure 1-1 in the attached EIS/R.

The proposed project consists of dredging approximately 5.6 million cubic yards (mcy) of material at the main approach channel and placing the material in the approved Port of Los Angeles (POLA) Pier 400 footprint, the Main Channel Pit, and the Southeast Energy Island Pit. The POLA would take 2.0 mcy; the Main Channel Pit would accommodate 2.1 mcy; and the Energy Island pit would accommodate 1.5 mcy. Chapter 3 in the attached EIS/R presents a detailed alternative analysis and the recommended alternatives to be analyzed in detail while Chapter 6 presents the Environmentally Preferred Alternative, the National Economic Development Plan, and the Recommended Plan, which is stated above.

b. Purpose [2.2]: The navigation improvements at the POLB are needed to accommodate large, deep-draft vessels transporting crude oil to Berth T121 (see Figure 1-1 in the attached EIS/R), thereby improving cargo movement efficiencies and reducing transportation costs.

c. Authority [2.4 & 4]: This evaluation has been prepared pursuant to Section 404(b)(1) of the Clean Water Act of 1977 (33 USC 1344) which applies to the discharge of dredged or fill material into navigable waters of the U.S.

Federal authorization and involvement in providing navigation features and improvements for Long Beach Harbor dates from 1856. Congress has authorized federal participation in the study of improvements in response to specific requests. The primary concern has been to ensure that harbor facilities are adequate to efficiently meet present and future cargo handling and distribution needs. The following is a summary of recent Congressional authorizations:

- The Water Resources Development Act of 1986 (P.L. 99-662, Title II, Harbor Development, Section 201(b) and Section 905);
- Water Resources Development Act of 1988 (P.L. 100-676, Section 4, Project Modifications); and
- Water Resources Development Act of 1990 (P.L. 101-640, Section 102, Project Modifications).

d. General Description of Dredged or Fill Material [3.2.2; 4.1; & 4.2]: Based on geotechnical sampling and analyses, the proposed dredge area is characterized as predominantly silty-sand and sandy-silt, consisting of 1 to 3 percent sands. Combining like materials, the breakdown is estimated as follows: sand (fines) = 2,600 mcy, silt = 2,100 mcy, and clay = 600 cy. Chemical testing indicates the proposed dredge material is relatively free of contaminants as compared to the reference sites and SCCWRP Clean California Coast data. The proposed dredge material has lower elevations of chemical contaminants than disposal area sediments. The proposed dredge material is suitable for placement in the recommended placement sites. The geotechnical and chemical report is included as an attachment in the Feasibility Study.

e. Description of the Proposed Discharge Sites [2.1; 4.1; & 4.2]: The proposed dredged material sites are characterized in the following table and are identified in Figure 3.1 in the attached EIS/R. The habitat type is characterized as soft-bottom sandy-silt habitat. More detailed analyses are provided in the text of the EIS/R and in the geotechnical and chemical report.

SUMMARY CHARACTERISTICS OF POTENTIAL PLACEMENT SITES

Placement Site	Distance from Dredge Site (mi.)	Capacity (mcy)	Placement Depth (ft., MLLW)	Approx. Existing Depth (ft., MLLW)	Approx. Depth After Placement (ft., MLLW)
POLA Pier 400 Landfill	4.2	2.0	Variable	Variable	Variable
Borrow Pits					
• Main Channel Pit	2.5	2.1	-90	-90	-80
• Energy Island					
- North Pit	3.4	7.2	-60	-60	-30
- Southeast Pit	3.7	1.5	-60	-60	-30
• LA River Mouth Pit	3.3	1.0	-50	-50	-30
LA-2	8.7	5.6	-387 to -1,050	-387 to -1,050	Variable

f. <u>Description of Dredging and Disposal Methods</u> [3.4.1; 3.4.3]: One 3,600-cy capacity hopper dredge would most likely be used for dredging and placement of the estimated 5.6 mcy of material.

A hopper dredge picks up material by pulling a suction drag head along the bottom. The excavated material is stored on-board in a compartment called the vessel hopper. When full, it travels and discharges its load at the placement site, either by bottom dumping or pumping out the material. The hopper dredge is assumed to use bottom dumping for placement of material into the North Channel area at the POLA, into the borrow pits, or at the LA-2 site. (For the POLA option, the sediment would then be transported by electric hydraulic dredge into the Pier 400 landfill area.) The support equipment for a trailing suction hopper dredge includes a 50-foot crew boat, a 25-foot survey boat, and buoys for marking off work areas.

f. <u>Timing and Duration of Discharge</u> [3.4.1; 3.4.2]: Construction of the proposed project is planned to start in 1997. Dredge activities and placement would occur 24 hours per day. Construction is estimated to vary between 16 and 22 months, depending on which placement sites are used.

III. FACTUAL DETERMINATIONS.

A. Disposal Site Physical Substrate Determinations:

1. Substrate Elevation and Slope:

Impact: ____N/A __X__INSIGNIF. ____SIGNIF.

Documentation: Local bathymetry is displayed on Figure 4.3-1 and local physical parameters are presented in Sections 4.1.1 and 4.2.1 of the attached EIS/R. The proposed project is not expected to result in significant substrate impacts.

It is anticipated that the deepened entrance channel will not require any periodic maintenance dredging because there is minimal littoral movement or sediment sources in the dredge area.

Disposal activities include restoring or raising current pit elevations to near adjacent levels. Pit filling activities are not expected to result in significant oceanographic/bathymetry changes.

2. Sediment Type:

Impact: ____N/A __X__INSIGNIF. ____SIGNIF.

Documentation: Local sediment profiles are presented as an attachment to the Feasibility Study and are discussed in Sections 4.1.1 and 4.2.1 of the attached EIS/R. Dredge sediments have been determined to be compatible with placement sediments. The proposed project is not expected to result in significant sediment compatibility impacts.

3. Dredged/Fill Material Movement:

Impact: ____N/A __X__INSIGNIF. ____SIGNIF.

Documentation (4.1; 4.2): Dredged material will be placed as discussed above. Material impacts are not anticipated at either the dredge or fill sites.

4. Physical Effects on Benthos (burial, changes in sediment type, composition, etc.):

Impact: ____N/A __X__INSIGNIF. ____SIGNIF.

Documentation [4.1.2; 4.4.2]: Temporary short-term impacts will occur. Recolonization is anticipated within about 2 to 3 years. No long-term significant impacts are expected.

5. Other Effects [4.2; 4.3]:

Impact: ____N/A __X__INSIGNIF. ____SIGNIF.

6. Actions taken to Minimize Impacts

Needed?: _____YES __X__NO

B. <u>Effect on Water Circulation, Fluctuation, and Salinity Determinations</u>:

1. Effect on Water. The following potential impacts were considered [4.2]:

Salinity	____N/A	X INSIGNIF.	____SIGNIF.
Water Chemistry (pH, etc.)	____N/A	X INSIGNIF.	____SIGNIF.
Clarity	____N/A	X INSIGNIF.	____SIGNIF.
Color	____N/A	X INSIGNIF.	____SIGNIF.
Odor	____N/A	X INSIGNIF.	____SIGNIF.
Taste	X N/A	____INSIGNIF.	____SIGNIF.
Dissolved gas levels	____N/A	X INSIGNIF.	____SIGNIF.
Nutrients	____N/A	X INSIGNIF.	____SIGNIF.
Eutrophication	____N/A	X INSIGNIF.	____SIGNIF.
Others	____N/A	X INSIGNIF.	____SIGNIF.

Water quality would be temporarily affected during the dredging process. Turbidity impacts would occur. Decreases in DO, increases in nutrients, and increases in suspended and dissolved metals and organic chemicals may also occur; these changes are not expected to be significant. The project is expected to have no impacts on pH, salinity, or water temperature. The proposed project is not expected to significantly affect water circulation, fluctuation, and/or salinity (see III.A.1).

2. Effect on Current Patterns and Circulation. The potential of discharge or fill on the following conditions were evaluated [4.2]:

Current Pattern and Flow	____N/A_X__INSIGNIF.____SIGNIF.
Velocity	____N/A_X__INSIGNIF.____SIGNIF.
Stratification	____N/A_X__INSIGNIF.____SIGNIF.
Hydrology Regime	____N/A_X__INSIGNIF.____SIGNIF.

The project as proposed is not expected to significantly affect current patterns or circulation (see section III.A.1).

3. Effect on Normal Water Level Fluctuations. The potential of discharge on fill on the following were evaluated [4.2]:

Tide	____N/A_X__INSIGNIF.____SIGNIF.
River Stage	____N/A_X__INSIGNIF.____SIGNIF.

The proposed project is not expected to significantly affect the normal water level fluctuations.

C. <u>Suspended Particulate/Turbidity Determinations at the Disposal Site:</u>

1. Expected Change in Suspended Particulate and Turbidity levels in Vicinity of Disposal Site [4.2/4.3]:

Impact: ____N/A_X__INSIGNIF.____SIGNIF.

Documentation: Detailed impact discussions are provided in Sections 4.2 and 4.3 of the attached EIS/R. Impacts will be temporary and adverse, but not significant. No long term impacts are expected.

At the dredge site, the plume from the hopper may vary between 1,000 and 4,000 feet from the dredge. Depending on the wave environment, turbidity may extend beyond 4,000 feet. The duration of the turbidity plume is expected to be short, with concentration of suspended solids returning to background levels within one to 24 hours after dredging stops.

At the placement sites, the plume may vary between 500 and 1,000 feet from the dredge. Depending on the wave environment, turbidity may extend beyond 1,000 feet; however, tidal currents in the Long Beach harbor are weak. The duration of the turbidity plume is also expected to be short.

2. Effects (degree and duration) on Chemical and Physical Properties of the Water Column [4.1; 4.2; & 4.3]:

Light Penetration	____N/A__X__INSIGNIF.____SIGNIF.
Dissolved Oxygen	____N/A__X__INSIGNIF.____SIGNIF.
Toxic Metals & Organic	____N/A__X__INSIGNIF.____SIGNIF.
Pathogen	____N/A__X__INSIGNIF.____SIGNIF.
Aesthetics	____N/A__X__INSIGNIF.____SIGNIF.
Others	____N/A__X__INSIGNIF.____SIGNIF.

3. Effects of Turbidity on Biota: The following effects of turbidity on biota were evaluated [4.3]:

Primary Productivity	____N/A__X__INSIGNIF.____SIGNIF.
Suspension/Filter Feeders	____N/A__X__INSIGNIF.____SIGNIF.
Sight feeders	____N/A__X__INSIGNIF.____SIGNIF.

Documentation: Detailed impact discussion is provided in Section 4.3 of the attached EIS/R. Impacts will be temporary and adverse, but not significant. Recolonization is anticipated within about 2 to 3 years. No long-term significant impacts are expected.

4. Actions taken to minimize Impacts.

Needed?: _____YES __X__NO

Taken: __X__YES _____NO

Measures to reduce turbidity at the material placement sites would include the following:

- At the dredge site, the hopper would be filled to the top with the sediment-water slurry mixture. The heavier material would settle to the bottom of the hopper, leaving several feet of muddy water on the top. This muddy water, containing much of the fine material, would be weired off to minimize the amount of fines deposited at the placement site.
- At the placement site, the hopper barge discharge would be performed quickly so that the dredged material would fall as a mass to minimize turbidity.

D. Contaminant Determination:

The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate).

1. Physical characteristics.................... _X_

2. Hydrography in relation to known or anticipated sources of contaminants.............................. _X_

3. Results from previous testing of the material or similar material in the vicinity of the project................................. _X_

4. Known, significant, sources of contaminants (e.g. pesticides) from land runoff or percolation............. __

5. Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances.................................. __

6. Other public records of significant introduction of contaminants from industries, municipalities or other sources.................................... _X_

7. Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities........... _X_

8. Other sources (specify)................... __

An evaluation of the appropriate information above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to constraints. The material meets the testing exclusion criteria [4.2; 4.3].

YES__X___NO_____

Impact: ____N/A__X__INSIGNIF._____SIGNIF.

Documentation: Physical and chemical testing was conducted for the dredge and placement site materials, and indicates that dredge and placement sediments are both physically and chemically suitable and compatible. Geotechnical results are presented in an attachment to the Feasibility Study.

E. <u>Effect on Aquatic Ecosystem and Organism Determinations: The Following ecosystem effects were evaluated</u> [4.3]:

On Plankton ____N/A__X__INSIGNIF.____SIGNIF.______
On Benthos ____N/A__X__INSIGNIF.____SIGNIF.______
On Nekton ____N/A__X__INSIGNIF.____SIGNIF.______
Food Web ____N/A__X__INSIGNIF.____SIGNIF.______

F. Sensitive Habitats: __X__N/A___INSIGNIF.____SIGNIF.

G. Sanctuaries, refuges
1. Wetlands __X__N/A___INSIGNIF.____SIGNIF.
2. Mudflats __X__N/A___INSIGNIF.____SIGNIF.
3. Eelgrass beds __X__N/A____INSIGNIF.___SIGNIF.
4. Riffle and Pool Complexes _X_N/A__INSIGNIF.__SIGNIF.

H. Threatened & Endangered Species
____N/A__X__INSIGNIF.____SIGNIF.

Several special concern species are known to occur in the vicinity of the project area, including species listed as threatened or endangered and marine mammals. Table 4.3-1 (in the attached EIS/R) lists special status species known or expected to occur in the project area, their state and federal status, and information on occurrence in the project area. Although additional species of marine mammals may pass through the area, they are not included in the table due to the low frequency of occurrence in the project area.

The two listed species of primary concern are the California least tern and California brown pelican because both species are known to use the harbor area regularly. Although these species forage widely throughout the area, potential dredge/fill impacts would not effect local populations nor jeopardize the continued existence of the species. [see section 4.4.2 of the attached EIS/R]

I. Other Wildlife (grunion, Pismo clams)
__X__N/A____INSIGNIF.____SIGNIF.

Documentation [4.1.2; 4.4.2]: State sensitive species will not be impacted. Although the soft bottom marine community associations will be temporarily impacted, recolonization is anticipated within about 2 to 3 years. No long-term significant impacts are expected.

Actions Needed to Minimize Impacts: No.

J. Proposed Disposal Site Determinations: Is the mixing zone for each disposal site confined to the smallest practicable zone?

__X__YES ____NO

Documentation [6]: The recommended plan is the environmentally preferred plan; this plan minimizes the mixing zone to the smallest practicable zones for disposal. To minimize mixing zone impacts and recognize future potential pit uses, the resource agencies were coordinated with to provide supplemental information and analyses.

K. Determination of Cumulative Effects of Disposal or Fill on the Aquatic Ecosystem [4; 10]:

Impacts: ____N/A__X__INSIGNIF.____SIGNIF.

L Determination of Indirect Effects of Disposal or Fill on the Aquatic Ecosystem [4.1 - 4.10]:

Impacts: ____N/A__X__INSIGNIF.____SIGNIF.

IV. FINDING OF COMPLIANCE.

A review of the proposed project indicates that:

1. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose

__X__YES _____NO

2. The activity does not appear to: 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and 3) violate requirements of any Federally designated marine sanctuary.

__X__YES _____NO

3. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values;

__X__YES ____NO

4. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

___X__YES _____NO

<u>On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material (specify which) is (select one)</u>:

_______ (1) Specified as complying with the requirements of these guidelines; or,

___X___ (2) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem; or,

_______ (3) Specified as failing to comply with the requirements of these guidelines.

Prepared by: Russell T. Kaiser

Position: Environmental Manager / Marine Ecologist

Date: 5-25-95

Appendix E

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California 92008

December 22, 1994

Colonel Michal Robinson
District Engineer
U.S. Army Corps of Engineers
P.O. Box 2711
Los Angeles, California 90053-2325

Attn: Mr. Russell L. Kaiser, Environmental Planning Section

Re: Planning Aid Letter for Queens Gate Entrance Channel Deepening Project, Long Beach Harbor, Los Angeles County, California

Dear Colonel Robinson:

Enclosed is our Planning Aid Letter (PAL) for the Queens Gate Entrance Channel Deepening Project, Long Beach Harbor (Los Angeles County, California). This is in partial fulfillment of the Fiscal Year 1995 Scope of Work (E86 95 0020) dated November 29, 1994. In this Scope of Work, we agreed to provide the PAL within 30 days of the receipt of project alternatives. We received these alternatives on December 1, 1994.

We hope that the Corps finds our technical assistance useful and we look forward to continued exchange during the planning process for this project. If you have any questions regarding our PAL, please contact Robert James of my staff at (619) 431-9440.

Sincerely,

Robert James, Jr.

for Gail C. Kobetich
Field Supervisor

cc: California Department of Fish and Game (Attn: Mr. Richard Nitsos)
National Marine Fisheries Service (Attn: Mr. Robert Hoffman)
California Coastal Commission (Attn: Mr. Charles Posner)
Calif. Regional Water Quality Control Board (Attn: Mr. Michael Lyons)
Port of Long Beach (Attn: Dr. Robert Kanter)

PLANNING AID LETTER

Queens Gate Entrance Channel Deepening Project
Long Beach Harbor
Los Angeles County, California

Prepared for the
U.S. Department of the Army
Corps of Engineers
Los Angeles District

by the
U.S. Department of the Interior
Fish and Wildlife Service
Region 1
Carlsbad Field Office
Carlsbad, California
(619) 431-9440

Robert James
Project Biologist and Author

John Hanlon
Chief, Branch of Federal Projects

Gail C. Kobetich
Field Supervisor

December 1994

PREFACE

This is in partial fulfillment of the Fiscal Year 1995 Scope of Work (E86 95 0020) between our agencies requesting that the U.S. Fish and Wildlife Service (Service) provide a Planning Aid Letter (PAL) regarding potential effects to the fish and wildlife resources by the Queens Gate Entrance Channel Deepening Project, Long Beach Harbor, located in Los Angeles County, California. This project is a reconnaissance/feasibility study being conducted under the authority of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662, enacted November 17, 1986 under Title II, Harbor Development, Section 201(b), WRDA of 1988 (Public Law 100-676, enacted November 17, 1988), and WRDA of 1990 (Public Law 101-640, Section 102(c)).

The Scof Wope ork (SOW) briefly outlined the project plans, history, and study area descript The ion. U.S. Army Corps of Engineers (Corps) also provided a number of maps and dias furgramher characterizing the area and proposed project. Our information is preliminary in nature and is provided as technical assistance to aid in your planning process. The PAL describes: 1) the public fish and wildlife resources within the area by providing a characterization, to date, of the existing biological environment based on a literature review; 2) a characterization of potential project impacts; and 3) preliminary avoidance and mitigation measures to minimize impacts to these biological resources.

The Service's analysis of this project and recommendations are based on information provided in 1) the project description in the SOW, 2) a site visit by the Service, 3) previous PAL's and a Fish and Wildlife Coordination Act Report by the Service for nearby locations (U.S. Fish and Wildlife Service 1984a, 1987, 1992a), 4) a previous Corps report (U.S. Army Corps of Engineers 1986), 5) various scientific studies, technical reports, memoranda, and letters (see literature cited), 6) information contained in the Service's files and library, 7) interviews with other biological experts, and 8) the best collective professional and scientific judgement of the Service.

The proposed project area was considered to be the Long Beach Harbor and waters to -80' MLLW within a five mile radius. This encompasses the proposed dredge and potential disposal areas. On December 7, 1994, a site visit was made to assess habitats and biological resources within the proposed project area. Due to the time of year, many species were not observed that would be expected at other times of the year and in more optimum conditions.

This letter is for planning and technical assistance purposes only and does not constitute the report of the Service or the Department of the Interior as required by the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

QUEENS GATE ENTRANCE CHANNEL DEEPENING PROJECT
LONG BEACH HARBOR
LOS ANGELES COUNTY, CALIFORNIA

INTRODUCTION

The general area is described in the Fish and Wildlife Coordination Act Report for the Los Angeles Harbor Channel and Landfill Development Project (U.S. Fish and Wildlife Service 1992a, Figure 1). Two independent commercial ports share the San Pedro Bay marine ecosystem. These human-created harbors have been created through a century of dredging and filling in the now-nonexistent estuary and salt marsh of the 3,450 acre Wilmington Lagoon. The harbors consist of about 1,800 acres of water in the inner navigation channels, 5,700 acres of land, and 6,000 acres of water (sheltered anchorages and navigation channels) between the landfills and the nine miles of Federally constructed and maintained breakwater. Between the two ports are the U.S. Navy's Long Beach Naval Shipyard and Naval Station. On the landward side is the sprawling megalopolis of Los Angeles.

Breakwaters were constructed along the 50-foot depth contour. Virtually all of the outer harbor in the Port of Long Beach is greater than 30 feet deep, while approximately half of the outer harbor in the Port of Los Angeles is greater than 30 feet deep. The navigation channels (45 feet deep and greater) have all been created by dredging. Several hundred acres remain of waters shallower than 20 feet, mostly within the Port of Los Angeles. San Pedro Bay is now characterized as a semi-enclosed, shallow, coastal embayment. Such coastal embayments are nearly as scarce as the estuary that it replaced. Offshore, bottom depths are less than 600 feet deep for only a few miles before the San Pedro escarpment begin its plunge to a depth of 2,400 feet.

Two rivers, both highly channelized for flood control, flow into the nearby Pacific Ocean. The Los Angeles River outlet is at the Long Beach Harbor, while the San Gabriel River ends approximately five miles downcoast at the Los Angeles-Orange County line. Between beachfront residences on the coastline are boat marinas and beaches, both heavily used for recreational activity that peaks during the summer months.

EXISTING ENVIRONMENT

The physical environment of deepwater habitats in the Long Beach Harbor would be characterized by Cowardin et al. (1979) as Marine System, with Subtidal and Intertidal Subsystem. Within the Subtidal Subsystem would be the following Classes: Rock Bottom and Unconsolidated Bottom. Within the Intertidal Subsystem would be the following Classes: Rocky Shore (jetties and breakwaters) and Unconsolidated Shore (beaches).

The distribution of sediment types in Long Beach Harbor was reported *in* MBC Applied Environmental Sciences (1984). The sand:silt+clay ratio varied greatly within the Harbor due to the outfall of the Los Angeles River and past dredging activities. The area oceanward from the Queens Gate entrance was considered an area of 76:24 ratio for approximately 4,000 feet. Further oceanward and slightly southeast, the ratio was measured at 96:4.

Invertebrates

Benthic invertebrates were surveyed in the Long Beach Harbor (MEC Analytical Systems, Inc. 1988a). Previous studies in Los Angeles and Long Beach Harbors are reported *in* MBC Applied Environmental Sciences (1984). In the Los Angeles Harbor, polychaetes were the dominant taxonomic group, followed, in order, by crustaceans, molluscs, and echinoderms. In Long Beach Harbor, surveys reached similar findings. The majority of these invertebrates are burrowing animals that live in mud or sand.

Site and species groupings within Long Beach Harbor were found to follow broad sediment distributional patterns. Invertebrate secondary production was estimated to be among the highest "...along a gradient from Queensway Bay to the offshore areas." These organisms undoubtedly support the diverse and abundant fish and bird populations within the Long Beach Harbor.

Fishes

Fish populations of San Pedro Bay are diverse and abundant with 130 species reported and 70 considered common in occurrence (MEC Analytical Systems, Inc. 1988a, *in* U.S. Fish and Wildlife Service 1992a). Several species ranking high in abundance estimates were white croaker (Genyonemus lineatus), queenfish (Seriphus politus), California grunion (Leuresthes tenuis), white surfperch (Phanerodon furcatus), northern anchovy (Engraulis mordax), shiner surfperch (Cymatogaster aggregata), California tonguefish (Symphurus atricauda), and speckled sanddbab (Citharichthys stigmaeus). Other less numerous but ecologically or recreationally important species are: California halibut (Paralichthys californicus), barred sand bass (Paralabrax nebulifer), kelp bass (Paralabrax clathratus), California corbina (Menticirrhus undulatus), Pacific bonito (Sarda chiliensis), California barracuda (Sphyraena argentea), white seabass (Cynoscion nobilis), jacksmelt (Atherinopsis californiensis), and several species of rockfish (family Scorpaenidae), sharks, and rays. The outer harbors, especially the shallower areas, are considered to have a significant nursery function for a variety of coastal marine fishes.

The California grunion (Leuresthes tenuis) is a species of public interest as a recreation fishery and tourist attraction. The species spawns on sandy beaches at high tides in the summer months. It is considered common south of Point Conception (Miller and Lea 1972). Grunion strand themselves at the upper end of the wave wash zone to lay their eggs in the moist beach sand and then return to the ocean. The eggs incubate in moist sand for approximately 10 days and hatch when agitated by the surf during high tide conditions. All of the beaches within the region would likely have grunion spawning.

Birds

The diverse and abundant migratory bird community includes about 150 species, dominated by coastal, water-associated birds, shorebirds, and waterfowl (MBC Applied Environmental Sciences 1984, MEC Analytical Systems, Inc. 1988b, *in* U.S. Fish and Wildlife Service 1992a). These birds use the outer harbor during annual migrations and for overwintering. The most abundant birds include several gull species (Heerman's, Larus heermanni; western, L. occidentalis; California, L. californicus; ring-billed, L. delawarensis; and Bonaparte's, L. philadelphia), the State and Federally endangered brown pelican (Pelecanus occidentalis), surf scoter (Melanitta perspicillata), cormorant species (Phalacrocorax spp.), grebe species (Aechmophorus spp.), other tern species (Sterna spp.), cinnamon teal (Anas cyanoptera), lesser scaup (Aythya affinis), sanderling (Calidris alba), and willet (Catoptrophorus semipalmatus). The shallower areas seem particularly valuable for these migratory birds.

Quantitative data from three nearby sites are available. Collins and Collins (1994) reported winter bird density at the adjacent Shoreline Aquatic Park, immediately downcoast from the Los Angeles River outfall. In five years, 48 species were recorded. In 1993, a total of 28 species were observed (2,980 individuals/40 hectares). Ring-billed gull, American coot (Fulica americana), and western gull were the most commonly observed species. Colorado Lagoon at the end of Marine Stadium was also surveyed (Meade 1994). This location is in Long Beach downcoast from the Los Angeles River. A total of 31 species was observed, but only about half of the density reported by Collins and Collins (1994). Neither study reported any listed or Federal candidate species. A study of the Los Angeles River is reported in Garrett (1993). Among the highlights are considerable shorebird diversity and abundance as well as observations of a peregrine falcon (Falco peregrinus), a Federal and State endangered species, in the reach of the Los Angeles River from Willow Street to the ocean.

The State and Federally endangered California least tern (Sterna antillarum browni) is the only species to make significant breeding use of San Pedro Bay. The three nearby nesting sites are at Terminal Island in Los Angeles Harbor (Figure 3), Seal Beach National Wildlife Refuge, and Bolsa Chica State Ecological Reserve (Figure 4). The species currently breeds along the California coast from San Francisco south into Baja California. A summer resident species, least terns arrive in April and May and depart south in late August or early September after nesting and raising young. They are not present in the state during the fall, winter, and early spring. In 1980, only 835 pairs were estimated to be breeding in southern California (Garrett and Dunn 1981). With intensive management and the prior and continuing efforts of many dedicated persons, the population has expanded to over 2,250 pairs in 1993 (from unpublished Calif. Dept. of Fish and Game census data; Figure 2).

Numerous studies (*in* MEC Analytical Systems, Inc. 1988b) have shown that the principal foraging areas in the harbor are in shallow water (defined as <20 foot depth), likely due to the greater abundances of prey fish found there and proximity to the nesting sites. However, MBC Applied Environmental Sciences (1984) reported observing California least terns to a lesser extent in other locations in the Long Beach Harbor. A foraging study in Mission Bay

(San Diego County) showed the variability of tern foraging efforts (Southwest Research Associates, Inc. 1994). The U.S. Army Corps of Engineers (1986) noted that the species was observed foraging along the banks of the Los Angeles River near the river mouth. A foraging study at three least tern sites over two years showed that >80% of foraging took place within three miles of the nest sites (Atwood and Minsky 1983). The investigators also found foraging to a lesser extent up to five miles of the colony. However, it was usually (up to 90% of the time) within one mile of the coastline. The depth in these areas was no greater than 30 feet. Given these parameters, a map of most likely foraging areas was generated (Figure 4). It should be noted that foraging activities have been occasionally noted beyond these limits, especially in summer when juvenile birds disperse from the colonies to their southern wintering grounds.

The brown pelican is a bird of marine habitats from open ocean to inshore waters, bays, and harbors. The species has undergone a considerable decline, first noticed in the late 1960s (Garrett and Dunn 1981). The use of organochlorine pesticides and overharvesting of anchovies (the major food source) have been implicated as reasons for the decline (Garrett and Dunn 1981). Pelicans commonly use undisturbed beaches, breakwaters, and jetties as resting areas and forage nearby. The brown pelican was observed throughout the Long Beach Harbor as the second most abundant species throughout the year (MBC Applied Environmental Sciences 1984). They occur in lowest abundance in Long Beach Harbor during the winter months.

The peregrine falcon, a State and Federally endangered species, is primarily a fall transient along the coast in the vicinity of estuaries (Garrett and Dunn 1981). It has undergone a sharp decline in the last several decades, particularly as a nesting bird. For nesting, peregrines require cliff faces within range of foraging areas such as coastal estuaries, where they feed on shorebirds and waterfowl. With the addition of hacked birds (captive-bred birds released into the wild) it is expected that the population of the species will continue to expand. In addition to the aforementioned observation, MBC Applied Environmental Sciences (1984) reported a peregrine falcon in the nearby Shoreline Aquatic Park.

The Federally threatened Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus) nests on sandy beaches, saltpan areas of wetlands, and salt evaporation ponds from southern Washington to southern Baja California, Mexico, the Great Basin, and the Great Plains (U.S. Fish and Wildlife Service 1984b). Snowy plovers require open sandy beaches with sparse vegetative cover for nesting. The snowy plover forages for invertebrates in the intertidal zone, in dry, sandy areas above the high tide line, on salt pans, and along the edges of salt marshes and salt ponds. They are often found nesting among or in the vicinity of California least terns. Reasons for decline include human disturbance due to recreational beach use (including off-road vehicle use), loss of nesting habitat to shoreline development, and at some sites, predation by a variety of birds and mammals, particularly the common crow (Corvus brachyrhynchos), common raven (Corvus corax), and the non-native red fox (Vulpes fulva). Surveys for the species on southern California beaches with some recreation and military disturbances have found individuals (Page et al. 1986, U.S.

Fish and Wildlife Service 1992b). Nesting of the species would be very unlikely on Long Beach, but wintering individuals may occur. A single survey of Long Beach (undated) did not locate any western snowy plovers (reported in Page et al. 1986).

A single Belding's savannah sparrow (Passerculus sandwichensis beldingi) was observed in the riprap near the H.M.S. Queen Mary (MBC Applied Environmental Sciences 1984). This species is listed as State endangered and a Federal category two candidate. Category two candidates comprise taxa for which data in possession of the Service indicates that proposing to list as endangered and threatened is probably appropriate but for which conclusive data are not available. Presuming that the species was correctly identified, it is most likely a transient individual since there is no apparent habitat within Long Beach Harbor for this species. The Belding's savannah sparrow is a year-round resident of coastal saltmarshes dominated by pickleweed (Salicornia sp.) from Santa Barbara County to Baja California (Zembal et al. 1988). The nearest breeding populations are at the Los Cerritos Marsh and Seal Beach National Wildlife Refuge, both less than 10 miles downcoast from the Long Beach Harbor.

The light-footed clapper rail (Rallus longirostris levipes), a State and Federal endangered species, and the marbled murrelet (Brachyramphus marmoratus), a Federal threatened and State threatened candidate species, are both extremely unlikely to be present in the proposed project area. The habitat for the light-footed clapper rail is the lower littoral zone of coastal saltmarshes. According the Garrett and Dunn (1981) the marbled murrelet is "generally a casual visitant to inshore waters, but with occasional invasions." There is one record for San Pedro (near Los Angeles Harbor) on December 11, 1979.

A number of Federal category two species are more likely to be present at some time during the year. These species are harlequin duck (Histrionicus histrionicus), loggerhead shrike (Lanius ludovicianus), reddish egret (Egretta rufescens), and white-faced ibis (Plegadis chihi). MEC Analytical Systems, Inc. (1988a) reported the loggerhead shrike as occurring within the Long Beach Harbor area.

The western grebe (Aechmophorus occidentalis), commonly reported in the Long Beach Harbor (MBC Applied Environmental Sciences 1984, MEC Analytical Systems, Inc. 1988a, pers. obs.), is listed as a Special Concern by Tate (1986). Species listed on another early-warning list as State Species of Special Concern (California Department of Fish and Game 1990) are the common loon (Gavia immer), double-crested cormorant (Phalacrocorax auritus), osprey (Pandion haliaetus), California gull (Larus californicus), elegant tern, and black skimmer (Rynchops niger). All of these species have been documented in the study area.

Mammals

Pacific harbor seal (Phoca vitulina) and the California sea lion (Zalophus californianus) commonly utilize the open waters of rocky coasts and harbors. According to Ingles (1965), these species feed on fish, mollusks, and crustaceans. They would also be expected to utilize the breakwaters as haulout areas. The common dolphin (Delphinus delphis) is also relatively common in the nearshore waters.

The gray whale (Eschrichtius robustus), a Federally endangered species, migrates along the southern California coast twice a year from the Bering Sea to the lagoons of Baja California. They usually stay offshore. However, in the spring, juvenile whales have been observed within two nautical miles of the shore as they migrate north. The National Marine Fisheries Service has been petitioned to delist the species and is currently reviewing the petition. The gray whale is also protected by the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407, as amended).

PROPOSED ACTION ALTERNATIVES

The Corps of Engineers, Los Angeles District, proposes to deepen the navigation channel outside the Queens Gate entrance to allow vessels to enter the Port of Long Beach fully loaded. Dredging would be done to approximately the minus seventy six (-76) foot mean lower low water (MLLW) contour depth, removing approximately 5.7×10^6 yd^3 of dredge material. The current depths are between -59 and -69 feet MLLW. The dimensions of the proposed navigation channel are approximately 1,200 feet in width and 15,000 feet in length. This would be approximately 413 acres. These dimensions are the minimum needed for ship safety (Robert Kanter, Manager of Environmental Planning, Port of Long Beach, pers. comm.).

Disposal options are beach nourishment, fill of borrow pits, and offshore disposal (Table 1). A mixture of these options may be undertaken due to dredge material capacity limits at the various locations. Beach nourishment would be at East/Peninsula Beach, Seal Beach, and/or Surfside/Sunset Beach. This would be either on the beach or at nearshore mounds. Borrow pits are located in the Long Beach Main Channel (1), Energy Island White (4), and Surfside/Sunset (4). Two sites near the mouth of the Los Angeles River may be considered in lieu of locations downcoast from the San Gabriel River (Russ Kaiser, U.S. Army Corps of Engineers, pers. comm.). Offshore disposal, if undertaken, would be at the LA-2 site.

Dredging would be done with either a Trailing Suction Hopper Dredge or a Cutter-Suction Pipeline Dredge. The former works by picking up material by pulling a suction drag along the bottom. The excavated material is stored on-board. When the vessel is full, it travels and discharges its load at a disposal site. For disposal of material into the its or the

Table 1. Potential Dredge Material Sites Being Studied for the Port of Long Beach' Feasibility Study (data from U.S. Army Corps of Engineers). "MCY" denotes "million cubic yards." "MLLW" denotes "mean low lower water."

Site	Capacity (MCY)	Acres	Distance from approach channel	Depths (MLLW) or locations
Energy Island Pit - N	7.2	250	11-24,000	-60' to -30'
Energy Island Pit - SE	1.4	92	11-23,000	-60' to -30'
Peninsula Beach - Onshore	1.4	64	18-25,000	+10' to -10'
Peninsula Beach - Nearshore	1.0	118	18-25,000	-15' to -22'
Alamitos Bay	0.2	14	18-23,000	-40' to -20'
Seal Beach East - Onshore	0.5	28	24-28,000	+12' to -12'
Seal Beach East - Nearshore	0.4	55	24-28,000	-16' to -20'
Surfside-Sunset - Onshore	1.7	93	28-33,000	East of jetty
Surfside-Sunset - Nearshore	5.0	172	28-33,000	-20' to -30'
Surfside-Sunset - Stage 7	0.8	24	27-30,000	-36.5' to -32'
Surfside-Sunset - Stage 8A	1.1	19	30-32,000	-47' to -35'
Surfside-Sunset - Stage 9B	1.1	20	27-28,000	-51' to -40'
Surfside-Sunset - Stage 9C	0.8	15	32-36,000	-45' to -35'
Main Channel	2.1	130	7-21,000	-90' to -80'
LA-2 Offshore Dump	?	?	40-50,000	?
TOTAL	24.7			

nearshore mounds, a bottom dump hopper would be used. To pump sand directly on shore, a 1,000-2,000 foot pipeline would be used via a floating buoy. The latter dredge may be used only at the Long Beach Main Channel Disposal Site due to ocean swells and pipeline placement constraints. It functions by picking up material with the use of a cutterhead which loosens material which is then pumped through a series of pipes to its destination. Normal operation includes a continuous discharge pipeline extending from the point of excavation to the disposal area.

PRELIMINARY ANALYSIS OF DIRECT AND INDIRECT GENERIC IMPACTS FROM THE PROPOSED ACTION

The environmental complexities of sediment, water, and biological interactions means that it is necessary to review and evaluate the natural disturbance regime at the dredging and disposal sites and its relation with directly associated floristic and faunal communities for effective avoidance of adverse impacts on endangered, threatened, and other species of concern, as well as their habitats.

The dredging of approximately 413 acres at depths of -59' to -69' MLLW would result in the temporary elimination of the invertebrate communities at that location. Immediate recovery by some organisms would be a matter of months. A more diverse and abundant benthic community, with some resemblance to the original species assemblage, would form within a few years. There are no known methods to speed up or direct benthic recolonization towards the establishment of specific species.

A turbidity plume would be generated from dredging that may affect fish by decreasing visibility, altering behavior, and removing free-floating eggs. The intake velocity would influence the capability of fishes to avoid or escape from the dredge. Many non-mobile fauna could be smothered and potentially killed, such as polychaetes and amphipods. Filter-feeding and photosynthetic-dependent organisms could also be adversely affected. However, due to the relatively deep depth of the dredging, it would not be expected to impact visual sight-feeding birds such as the brown pelican and California least tern.

Filling of existing pits with dredge material would bring the elevations of these sites to the surrounding area, though there may be resuspension of pit sediments in water column. In some cases it would do so to about 20-30' MLLW, and thereby qualify as "shallow water" habitat. It is not currently believed that there are any meaningful biological communities within these pits, but it is an issue that should be further studied. Upon establishment of benthic infauna, it would be a positive effect. It would also eliminate the present anoxic sinks that are likely occurring in the pits due to poor water circulation.

Beach disposal would also have an adverse effect to aquatic and terrestrial resources. There would be expected mortality of invertebrates buried by sand. In addition, it disrupts and/or precludes the beach as a useful wildlife habitat for roosting birds, such as gulls and other shorebirds. If present, there may be impacts to the western snowy plover. Grunion spawning could be adversely affected. Of course, a factor in beach placement would have to be the for maintenance of the present beach by addition of sand to maintain existing habitat values.

A potential indirect effect is possible disturbance to brown pelicans on the middle breakwater due to operation of the dredge. If there is an effect and it is not mitigated, there would be continuing cumulative impact from Corps-proposed breakwaters and dredging projects at Oceanside Harbor, Redondo Beach-King Harbor, Ventura Harbor, and Santa Monica Bay.

Two other issues to be considered would be a possible increase in boat traffic through the Queens Gate Channel with the proposed action and possible disturbance effects to the endangered gray whale as individual whales travel along the coastline. Given current local beach replenishment projects, the cumulative effects of these actions should also be considered.

POTENTIAL MITIGATION CONCEPTS

In the past, the Service, California Department of Fish and Game, National Marine Fisheries Service, and the Ports of Los Angeles and Long Beach have been designing and executing mitigation plans for port development projects. The Corps of Engineers has largely observed this collaborative process without actually participating, but as a Federal regulatory agency, has issued port development permits based on these consensus mitigation plans. Past mitigation projects have or are being undertaken in the Upper Newport Bay, Seal Beach National Wildlife Refuge, and Batiquitos Lagoon.

Sandy, soft-bottom nearshore habitat is valuable, not only for the brown pelican and California least tern, but also for a number of fish species, particularly flatfishes (i.e. families Cynoglossidae, Bothidae, and Pleuronectidae). These species have important commercial and sport fishing value.

Turbidity changes should be avoided and minimized to the extent possible. This is especially important in shallow water disposal sites. Silt curtains should be employed to mitigate disturbance. The above-mentioned timing restrictions should be followed to eliminate impacts to the California least tern and California grunion. Proper scheduling will reduce negative effects to the brown pelican. If the beach disposal option is undertaken, the grunion spawning season should be avoided Survey data should be gathered concerning the status and distribution of the western snowy plover, in relation to beach disposal.

An onshore (landfill) alternative should also be investigated, especially if the physical and/or chemical nature of the sediment is unsuitable for beach nourishment and/or filling of offshore pits. This could be an important option if existing sediments within the former borrow pits could be resuspended within the water column. The LA-2 site may be better utilized for the disposal of other materials.

A possible measure would be the creation of an additional nesting island for the California least tern by utilizing some of the dredge material. A number of islands for oil recovery operations exist in the Long Beach Harbor outside of the shipping lanes (Islands White, Freeman, etc.). FAA Island in Mission Bay (San Diego County) is only one acre in size, but has been a successful nesting location for a number of years due primarily to isolation from mammalian predators. Predation from the common crow has been a persistent problem at the nearby Terminal Island nesting colony and may be reduced with greater distance from human habitation and associated food sources. If timing restrictions were followed, this would be considered an enhancement action, but within the mandate of a Federal agency to further contribute to the recovery of an endangered species. Such a measure would need to be further examined by experts on the Least Tern Recovery Team as well as the Port of Long Beach and other concerned agencies.

At this time, the Service-recommended alternative is that if dredge material is suitable from a physical and chemical standpoint, and there are no meaningful biological communities present, as many shallow pits as possible should be filled to the surrounding elevation. Discharge of dredged material should be done during the time period (November 16 to March 15) that eliminates conflicts to the California least tern, and reduces them insofar as possible to the brown pelican and California grunion. In this way additional shallow water habitat could be created with the expected recolonization of benthic invertebrates and their associated diverse biological communities.

RESOURCE INFORMATION GAPS AND SUGGESTED STUDIES

(1) The physical and chemical characteristics of the dredge material should be investigated. Analysis results should be made available to other concerned resource agencies such as the California Department of Fish and Game, National Marine Fisheries Service, California Regional Water Quality Control Board, and Coastal Commission. These data are needed to help determine the suitability of the various placement options.

(2) The marine communities inhabiting the former "borrow pits" should be inventoried and enumerated. Results of this study should also be made available to the above-listed agencies. These data are needed to determine possible impacts to dredge material placement.

(3) Up-to-date, site-specific data for the proposed project area are needed on the status and distribution of the western snowy plover so as to best assess project impacts. This is especially true for the plover if beach disposal is further examined as an option during the feasibility stage of the study.

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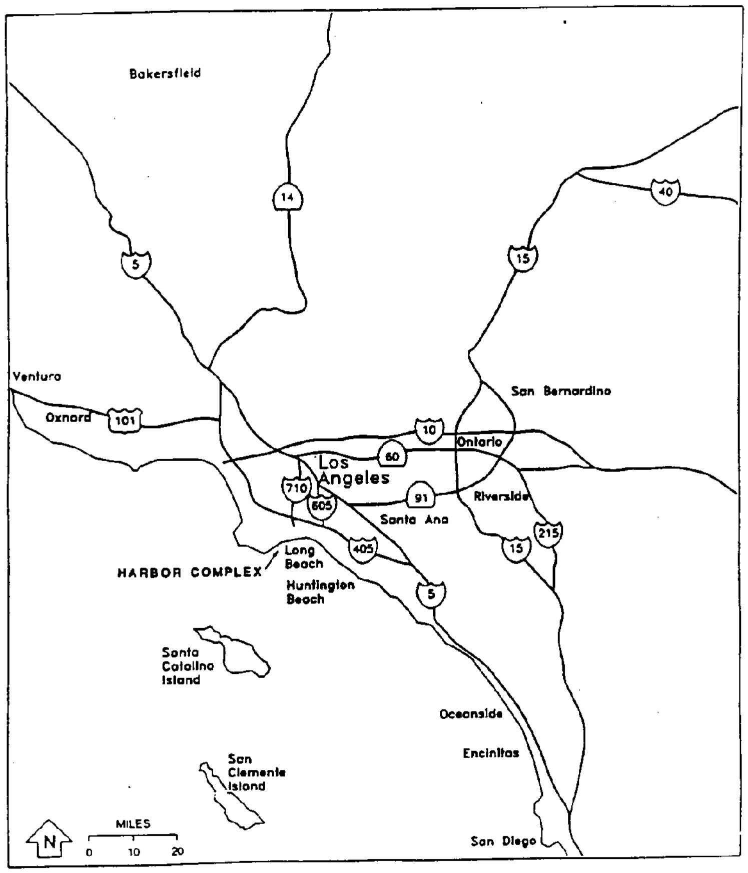
FIGURE 1 - PORT OF LONG BEACH LOCATION MAP



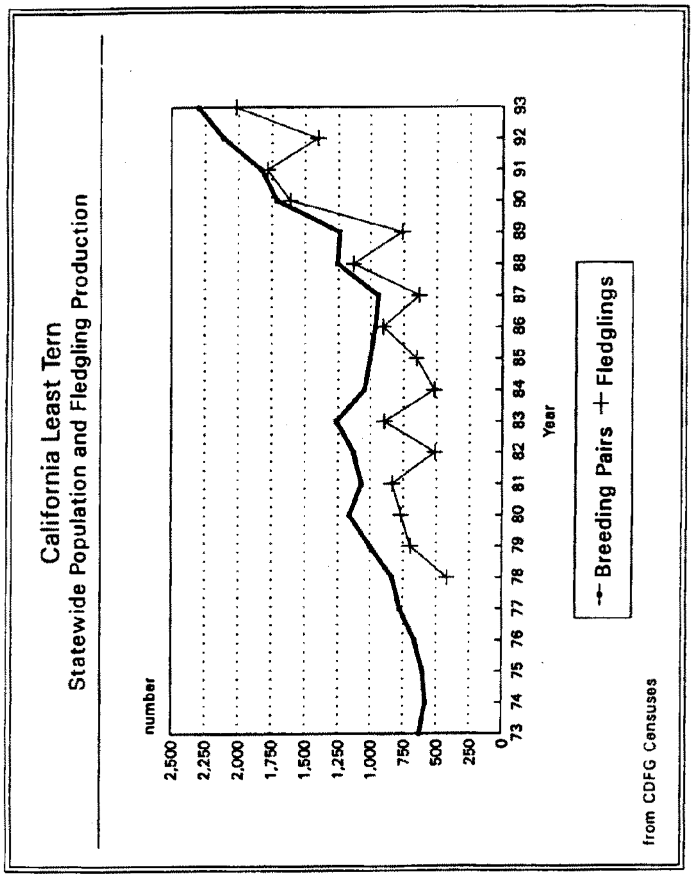

California Least Tern
Statewide Population and Fledgling Production
number
2,500
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93
Year
Breeding Pairs
Fledglings
from CDFG Censuses

Figure 2.

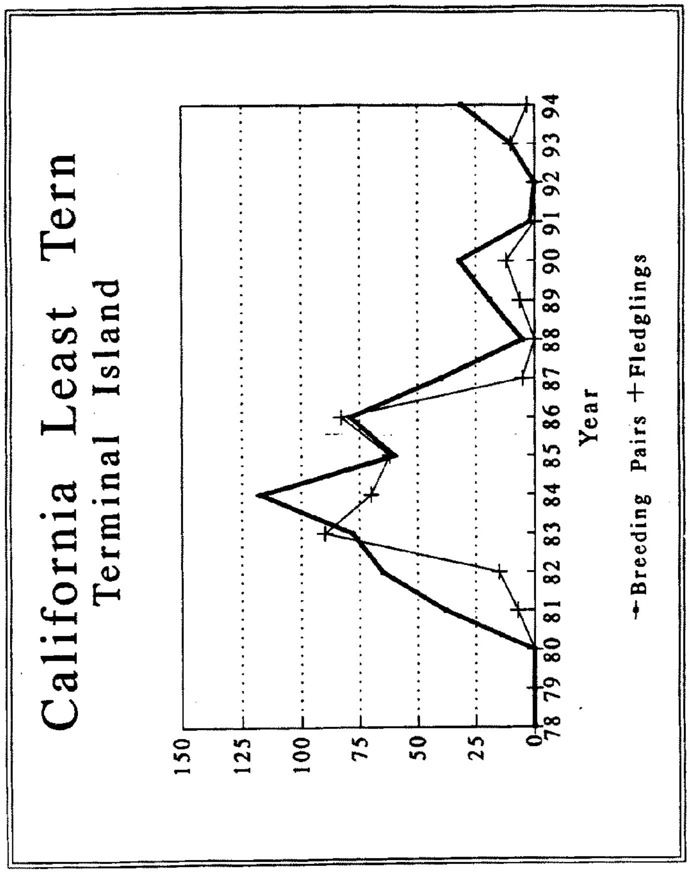

California Least Tern
Terminal Island
150
125
100
75
50
25
0
78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94
Year
Breeding Pairs
Fledglings

Figure 3.

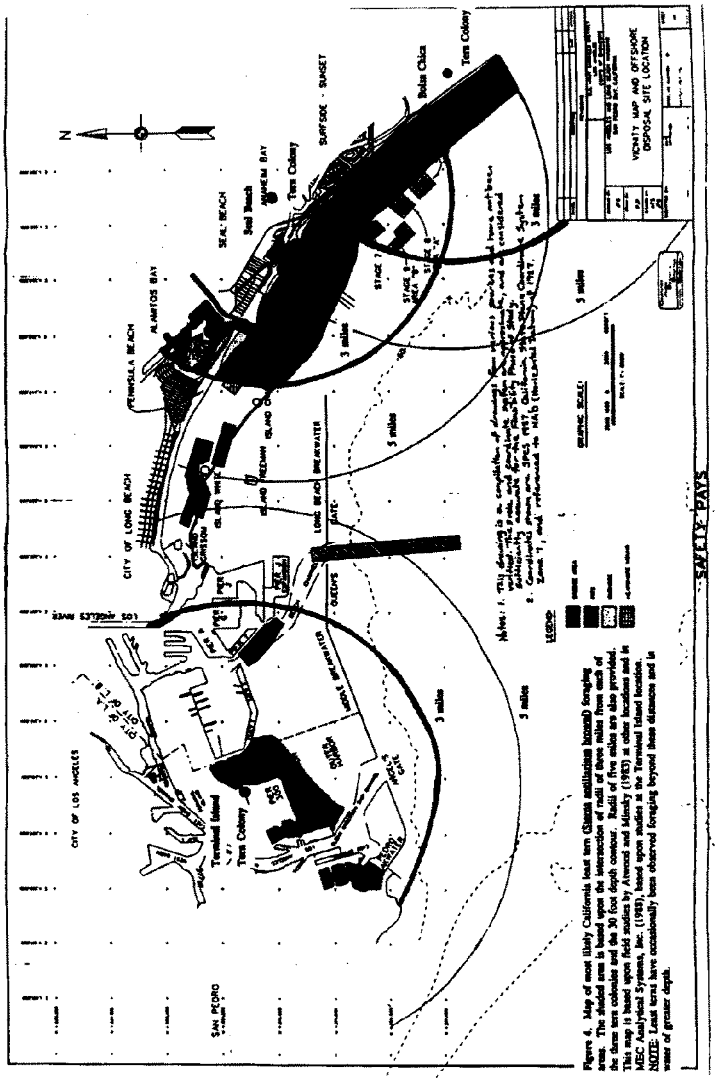


Figure 4. Map of most likely California least tern (Sterna antillarum browni) foraging areas. The shaded area is based upon the intersection of radii of three miles from each of the three tern colonies and the 30 foot depth contour. Radii of five miles are also provided. This map is based upon field studies by Atwood and Minsky (1983) at other locations and in MEC Analytical Systems, Inc. (1988), based upon studies at the Terminal Island location. NOTE: Least terns have occasionally been observed foraging beyond these distances and in water of greater depth.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California 92008

September 13, 1995

Colonel Michal Robinson
District Engineer
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, California 90053-2325

Attn: Mr. Russell L. Kaiser, Environmental Planning Section

Re: Draft Fish and Wildlife Coordination Act Report for the Port of Long Beach Channel Deepening Plan, Long Beach Harbor, Los Angeles County, California

Dear Colonel Robinson:

Enclosed is the Fish and Wildlife Service's Draft Fish and Wildlife Coordination Act Report (Report) for the Corps of Engineers Port of Long Beach Channel Deepening Plan, Long Beach Harbor, Los Angeles County, California. This Draft Report is provided as partial fulfillment of the Scope of Work (E86 95 0020) between our respective agencies dated November 29, 1994, for Fiscal Year 1995. This Draft Report supersedes the Draft Report issued on March 27, 1995.

This Draft Report constitutes the report of the Secretary of the Interior pursuant to section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The development of the Draft Report has been coordinated with the California Department of Fish and Game and the National Marine Fisheries Service.

Please provide any comments you may have or concurrence within 30 days of receipt of this Draft Report. If we do not receive any comments we will assume concurrence and prepare the final Report. If you have any questions, please contact Robert James, Project Biologist, or John Hanlon, Chief, Branch of Federal Projects, at (619) 431-9440.

Sincerely,

Gail C. Kobetich

Gail C. Kobetich
Field Supervisor

Enclosure

cc: CDFG, Region 5, Long Beach, CA (Attn: D. Nitsos)
NMFS, Long Beach, CA (Attn: R. Hoffman)
CCC, San Francisco, CA (Attn: J. Raives)
RWQCB, Monterey Park, CA (Attn: L. Jurevick)
EPA, San Francisco, CA (Attn: J. Amdur)

DRAFT
FISH AND WILDLIFE COORDINATION ACT REPORT

Port of Long Beach Channel Deepening Plan
Long Beach Harbor
Los Angeles County, California

Prepared for the

U.S. Department of the Army
Corps of Engineers
Los Angeles District

by the

U.S. Department of the Interior
Fish and Wildlife Service
Region 1, Carlsbad Field Office
Carlsbad, California
(619) 431-9440

Robert James
Project Biologist and Author

John Hanlon
Chief, Branch of Federal Projects

Gail C. Kobetich
Field Supervisor

September 1995

Executive Summary

The U.S. Army Corps of Engineers and the Port of Long Beach are proposing to deepen the existing approach and entrance channel at the Queens Gate entrance of Long Beach Harbor, Los Angeles County, California. The depth of the existing channel is -59 to -69 feet mean lower low water (MLLW). This channel would be deepened to -76 feet MLLW to accommodate large, deep-draft vessels. Approximately 5.6 million cubic yards of material would be removed by a trailing suction hopper dredge and disposed at three locations. Two million cubic yards would be placed into the Port of Los Angeles Pier 400 Landfill. A total of 2.1 million cubic yards would be placed in an existing borrow pit in Long Beach Harbor. The remaining 1.5 million cubic yards would be placed in a pit southeast of Energy Island White.

Diverse and abundant biological resources identified in biological surveys within the proposed project area include plankton and invertebrates, fishes, birds, and mammals. Three State and Federal endangered species are present in the project area. They include the brown pelican (Pelecanus occidentalis), California least tern (Sterna antillarum browni), and peregrine falcon (Falco peregrinus).

Sessile and some mobile invertebrates would be eliminated along with additional adverse impacts to fishes and birds due to the turbidity and sedimentation plumes at the dredge and disposal sites. The California least tern has a breeding colony at the Port of Los Angeles Pier 300 and could be affected by the proposed project.

The Fish and Wildlife Service recommends a number of mitigation measures be taken to offset these expected adverse impacts. These are (1) restricting dredge material disposal in the Pier 400 Landfill to the winter months, (2) minimizing turbidity at all locations, (3) minimizing noise and disturbance, (4) monitoring possible movement of contaminated materials within the proposed disposal areas, and (5) starting a regional dredged material management plan.

Preface

This Draft Fish and Wildlife Coordination Act Report is in partial fulfillment of the Fiscal Year 1995 Scope of Work (E86 95 0020) between our agencies requesting the Fish and Wildlife Service provide a Fish and Wildlife Coordination Act Report on potential effects to fish and wildlife resources by the Port of Long Beach Channel Deepening Plan, Long Beach Harbor, Los Angeles County, California. It is provided pursuant to section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and in keeping with the spirit and intent of the National Environmental Policy Act (Public Law 91-190). It has also been provided to the California Department of Fish and Game and National Marine Fisheries Service for their review, comments, or concurrence with the recommendations herein.

The Scope of Work briefly outlined the project plans, history, and study area description. The Corps of Engineers also provided a number of maps and diagrams further characterizing the area and proposed project. The Draft Fish and Wildlife Coordination Act Report describes (1) the existing biological environment including listed and candidate species occurring within the project area, (2) an analysis of potential environmental impacts from the proposed project, and (3) recommendations for mitigation of expected impacts.

The impact analysis of this project and recommendations are based on information provided in 1) the project description in the SOW and subsequent Corps-provided documents, 2) a site visit, 3) previous Planning Aid Letters and a Fish and Wildlife Coordination Act Report for nearby locations (U.S. Fish and Wildlife Service 1984a, 1987, 1992a), 4) a previous Corps of Engineers report (U.S. Army Corps of Engineers 1986), 5) various scientific studies, technical reports, memoranda, and letters, 6) information contained in our files and library, 7) interviews with other biological experts, and 8) the best collective professional and scientific judgment of the Fish and Wildlife Service.

On December 7, 1994, we visited the proposed project site to assess habitats accessible by land and biological resources within the proposed project area. Given the time of year, many species were not observed that would be expected at other times under more optimum conditions.

Table of Contents

List of Figures

INTRODUCTION

This project is a reconnaissance/feasibility study conducted under the authority of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662, enacted November 17, 1986 under Title II, Harbor Development, Section 201(b), WRDA of 1988 (Public Law 100-676, enacted November 17, 1988), and WRDA of 1990 (Public Law 101-640, Section 102(c)).

DESCRIPTION OF PROJECT AREA

Physical Environment

The vicinity of the project is described in the Fish and Wildlife Coordination Act Report for the Los Angeles Harbor Channel and Landfill Development Project (U.S. Fish and Wildlife Service 1992a) (Figure 1). Two independent commercial ports share the San Pedro Bay marine ecosystem. These harbors were created through a century of dredging and filling in of the 3,450 acre Wilmington Lagoon estuary and salt marsh. The harbors consist of about 1,800 acres of inner navigation channels, 5,700 acres of land, and 6,000 acres of sheltered anchorages and navigation channels, between the landfills and the nine miles of Federal constructed and maintained breakwater. Between the two ports are the U.S. Navy's Long Beach Naval Shipyard and Naval Station. On the landward side is the sprawling megalopolis of greater Los Angeles.

The breakwaters were constructed along the 50-foot depth isobath. Virtually all of the outer harbor in the Port of Long Beach is greater than 30 feet deep, while approximately half of the outer harbor in the Port of Los Angeles is greater than 30 feet deep. The navigation channels (45 feet deep and greater) were created by dredging. Several hundred acres of water shallower than 20 feet deep remain, mostly within the Port of Los Angeles. San Pedro Bay is now a semi-enclosed, shallow, artificial coastal embayment. Such coastal embayments are nearly as scarce as the estuary that it replaced. Water depths of less than 600 feet deep extend a few miles offshore to the San Pedro escarpment where water depths plunge to 2,400 feet.

Two rivers, both channelized along much of their reaches for flood control, flow into the nearby Pacific Ocean. The Los Angeles River flows into Long Beach Harbor, while the San Gabriel River flows into the Pacific Ocean about five miles downcoast at the Los Angeles-Orange County line. Between beachfront residences on the coastline are boat marinas and beaches, both heavily used for recreational activity that peaks during the summer months.

The physical environment of deep water habitats in the Long Beach Harbor would be characterized by Cowardin *et al.* (1979) as Marine System, with Subtidal and Intertidal Subsystem. Within the Subtidal Subsystem would be the following Classes: Rock Bottom and Unconsolidated Bottom. Within the Intertidal Subsystem would be the following Classes: Rocky Shore (jetties and breakwaters) and Unconsolidated Shore (beaches).

Contaminant and Sediment Analysis

Sea Surveyor, Inc. (1994) concluded that from the chemical contaminant analysis of the proposed dredge and disposal areas, the sediments from the proposed dredge area were acceptable for disposal at the "beach replenishment site," "LA-2 (offshore) disposal site," or the "Island White disposal site" (Figure 2). Their report stated that material was "generally low" in total organic carbon and that few samples had "detectable concentrations" of phenols, PCBs, mono- or dibutylins, or selenium. Further, concentrations of metals such as arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc "were all detected at relatively low concentrations...comparable to or lower than median concentrations reported for a clean California coastal area." However, since recent analysis from the "beach replenishment site" showed lower amounts of contaminants in comparison to material from the proposed dredge area, the Corps proposes to dispose the material into borrow pits.

The distribution of sediment types in Long Beach Harbor was reported in MBC Applied Environmental Sciences (1984) and Sea Surveyor, Inc. (1994). The sand:silt+clay ratio varied greatly within Long Beach Harbor, due to the inflow from the Los Angeles River and past dredging activities. The area oceanward from the Queens Gate entrance was considered an area of 76:24 ratio for approximately 4,000 feet. Further oceanward and slightly southeast, the ratio was measured at 96:4 (MBC Applied Environmental Sciences 1984). Sea Surveyor, Inc. (1994) reported that the potential disposal sites near Island White are "relatively similar to the soils in the potential dredge area." However, a greater percentage of "fine" material was found there than at the beach sites. Changes to the sediment arrangement is speculative at best, as it depends upon future depositional and other geological events.

DESCRIPTION OF PREFERRED ALTERNATIVE

The Corps of Engineers, Los Angeles District (Corps), proposes to deepen the navigation channel outside the Queens Gate entrance to allow fully loaded deep draft vessels to enter the Port of Long Beach (Figure 1). Dredging would be done to approximately minus seventy six (-76) feet (MLLW), removing approximately 5.6 million cubic yards of dredge material. The current depths are between -59 and -69 feet MLLW. The dimensions of the proposed navigation channel are about 1,200 feet in width and 11,000 feet in length, encompassing approximately 303 acres (Figure 2), the minimum area needed for safe ship operation.

The preferred disposal option is placement of dredge material in three locations. About two million cubic yards would be placed in the Port of Los Angeles Pier 400 landfill that is presently under construction. Approximately 2.1 million cubic yards would be placed in a deepened borrow pit area in the main channel of Long Beach Harbor. A total of 1.5 million cubic yards would be placed in the smaller deepened borrow pit area located near the Southeast Energy Island (Figure 2).

The Corps proposes to use a 3,600 cubic yard trailing suction hopper dredge that picks up material by pulling a suction drag along the bottom. The amount of wave action and boat traffic in the vicinity makes a pipeline dredge infeasible. The excavated material is stored on board. When the vessel is full, it discharges its load at a disposal site using a bottom dump hopper. To dredge and dispose of dredge material at each site with a single dredge, a construction period of 4-6 months is estimated for completion.

Measures to reduce turbidity at the material placement sites would be (1) allowing the sediment-water slurry to settle in the hopper dredge at the dredge site and weir off the turbid water; (2) discharge the dredge material quickly so that it would fall as a "mass" (U.S. Army Corps of Engineers and Port of Long Beach 1995).

DESCRIPTION OF BIOLOGICAL RESOURCES

Marine Habitats

Plankton and Invertebrates

Plankton are minute organisms that live in the water column and are passively carried by currents. Plankton consists of phytoplankton, zooplankton, and ichtyoplankton. They support the greater marine food chain or web of more conspicuous invertebrates, fishes, birds, and marine mammals. Phytoplankton are photosynthetic organisms that convert inorganic nutrients and solar energy into organic material, a process referred to as primary production. This production is crucial to most animal production in the ocean, therefore, the well-being of human society. Examples of such organisms are diatoms and dinoflagellates. Abundance of these organisms within Long Beach and Los Angeles harbors vary seasonally with light and nutrient concentrations. The pattern is consistent with other locations. Generally, there is a spring bloom of diatoms, followed by a summer reduction in abundance and a fall bloom of dinoflagellates (MBC Applied Environmental Sciences 1990).

Zooplankton are non-photosynthetic organisms that consume organic material, phytoplankton, and/or other organisms. Zooplankton is composed of copepods, and the eggs, larvae, and juveniles of crustaceans, mollusks, polychaetes, and essentially all marine life, other than fishes. Within Long Beach and Los Angeles harbors the zooplankton consists mostly of copepods, cladocerans, and larvaceans. Barnacles and brittlestar larva are also found (MBC Applied Environmental Sciences 1990).

Ichtyoplankton consists of the planktonic egg and larval stages of bony fishes. Studies within the Los Angeles and Long Beach harbors enumerated numerous fish species. Abundance was found greatest in the late winter and early spring after spawning (MBC Applied Environmental Sciences 1990).

Benthic invertebrates (i.e. infauna) were surveyed in the Long Beach Harbor (MEC Analytical Systems, Inc. 1988a, MBC Applied Environmental Sciences 1990). Previous studies in Los

Angeles and Long Beach harbors are reported in MBC Applied Environmental Sciences (1984). In Los Angeles Harbor, polychaetes were the dominant taxonomic group, followed, in order, by crustaceans, molluscs, and echinoderms. In Long Beach Harbor, surveys reached similar findings. The majority of these invertebrates are burrowing animals that live in mud or sand.

Polychaetes include burrowing, crawling, and free-swimming forms. Some excavate vertical or u-shaped burrows in soft sand or mud. The larvae are usually free-swimming (Curtis 1979). Polychaetes feed on small invertebrates, algae, and use organic matter present in sediments or suspended in the water column (Starr and Taggart 1987). Polychaetes have external gills that increase the surface area for respiration but are unprotected and, therefore, easily damaged (Curtis 1979). These species form the basis of a diverse marine food web.

Crustaceans are a diverse, largely aquatic group of predators, herbivores, and scavengers. They include shrimp, crayfish, lobsters, crabs, barnacles, and copepods (Starr and Taggart 1987). Some of these species have worldwide as well as local commercial and recreational fishing value.

Mollusks consist of a group of over 100,000 species worldwide broadly split into gastropods, bivalves, and cephalpods. Examples of gastropods are snails, sea slugs and nudibranchs. Most of these animals are grapers on soft or hard bottoms and kelp. Bivalves include clams, scallops, oysters, and mussels. Most of these species are filter feeders that produce currents to carry food particles to their mouth. Cephalopods include squid, octopus, nautilus, and cuttlefish (Starr and Taggart 1987), some of which support commercial fishing.

Site and species groupings within Long Beach Harbor were found to follow broad sediment distributional patterns. Invertebrate secondary production was estimated to be among the highest "...along a gradient from Queensway Bay to the offshore areas." These organisms undoubtedly support the diverse and abundant fish, bird, and marine mammal populations within the Long Beach Harbor. Invertebrate organisms also provide substantial ecological, utilitarian, scientific, and cultural benefits (Kellert 1993).

Fishes

Fish populations of San Pedro Bay are diverse and abundant with 130 species reported and 70 considered common in occurrence (MEC Analytical Systems, Inc. 1988a, in U.S. Fish and Wildlife Service 1992a). Several species ranking high in abundance were white croaker (Genyonemus lineatus), queenfish (Seriphus politus), California grunion (Leuresthes tenuis), white seaperch (Phanerodon furcatus), northern anchovy (Engraulis mordax), shiner surfperch (Cymatogaster aggregata), California tonguefish (Symphurus atricauda), and speckled sanddbab (Citharichthys stigmaeus). Other less numerous but ecologically or recreationally important species are California halibut (Paralichthys californicus), barred sand bass

(Paralabrax nebulifer), kelp bass (Paralabrax clathratus), California corbina (Menticirrhus undulatus), Pacific bonito (Sarda chiliensis), Pacific barracuda (Sphyraena argentea), white seabass (Atractoscion nobilis), jacksmelt (Atherinopsis californiensis), and several species of rockfish (family Scorpaenidae), sharks, and rays. The outer harbors, especially the shallower areas, have a significant nursery function for a variety of coastal marine fishes.

The California grunion (Leuresthes tenuis) is a species of public interest as a recreation fishery and tourist attraction. The species spawns on sandy beaches at high tides in the summer months. It is considered common south of Point Conception (Miller and Lea 1972). Grunion strand themselves at the upper end of the wave wash zone to lay their eggs in the moist beach sand and then return to the ocean. The eggs incubate in the moist sand for about 10 days and hatch when agitated by the surf during high tide conditions. All of the beaches within the region would likely support grunion spawning activities.

Reptiles

Four species of marine turtles may occur in offshore waters, but are extremely unlikely to be within the proposed project area (U.S. Army Corps of Engineers and Port of Long Beach 1995). These species are the leatherback turtle (Dermochelys coriacea), loggerhead sea turtle (Caretta caretta), green sea turtle (Chelonia mydas), and Pacific Ridley's turtle (Lepidochelys olivacea). The leatherback turtle is a Federal endangered species and the other species are Federal threatened species.

Birds

The diverse and abundant migratory bird community includes about 150 species, dominated by coastal, water-associated birds, shorebirds, and waterfowl (MBC Applied Environmental Sciences 1984, MEC Analytical Systems, Inc. 1988b, MBC Applied Environmental Sciences 1990, *in* U.S. Fish and Wildlife Service 1992a). These birds use the outer harbor during annual migrations and overwintering. The most abundant birds include several gull species Heermau's (Larus heermanni), western (L. occidentalis), California (L. californicus), ring-billed (L. delawarensis), and Bonaparte's (L. philadelphia), the State and Federal endangered brown pelican (Pelecanus occidentalis), surf scoter (Melanitta perspicillata), cormorant species (Phalacrocorax spp.), grebe species (Aechmophorus spp.), other tern species (Sterna spp.), cinnamon teal (Anas cyanoptera), lesser scaup (Aythya affinis), sanderling (Calidris alba), and willet (Catoptrophorus semipalmatus). The shallower areas seem particularly valuable for these migratory birds.

Quantitative data from three nearby sites are available. Collins and Collins (1994) reported winter bird density at the adjacent Shoreline Aquatic Park, immediately downcoast in the Los Angeles River estuary. Forty-eight species were recorded over a five year period. In 1993, a total of 28 species were observed (2,980 individuals/16.2 acres). Ring-billed gull, American coot (Fulica americana), and western gull were the most commonly observed species. Colorado Lagoon at the end of Marine Stadium in Alamitos Bay was also surveyed (Meade 1994). This location is in Long Beach downcoast from the Los Angeles River. A total of 31 species was observed, but only about half the density reported by Collins and Collins (1994). Neither study reported any Federal listed or candidate species. A study of the biota of the Los Angeles River from the headwaters to the Pacific Ocean is reported in Garrett (1993). Considerable shorebird diversity and abundance was observed. The peregrine falcon (Falco peregrinus), a Federal and State endangered species was observed, in the reach of the Los Angeles River from Willow Street to the ocean.

The State and Federal endangered California least tern (Sterna antillarum browni) is the only species to make significant breeding use of San Pedro Bay. Three nesting sites within 10 miles of the proposed project are at Terminal Island in Los Angeles Harbor, Seal Beach National Wildlife Refuge, and Bolsa Chica State Ecological Reserve. This species currently breeds along the California coast from San Francisco south into Baja California. California least terns are summer residents. They migrate north and arrive in April and May and return south in late August or early September after nesting and raising young. They are not present in California during the fall, winter, and early spring. In 1980, only 835 pairs were estimated to be breeding in southern California (Garrett and Dunn 1981). With intensive management and prior and continuing efforts of many dedicated persons, the population has expanded to over 2,250 pairs in 1993 (from unpublished California Department of Fish and Game census data).

Numerous studies (*in* MEC Analytical Systems, Inc. 1988b) have shown that the principal foraging areas in Long Beach Harbor are in shallow water (defined as <20 foot depth), likely due to the greater abundances of prey fish found there and proximity to the nesting sites. MBC Applied Environmental Sciences (1984) reported observing California least terns to a lesser extent in other locations in Long Beach Harbor. A foraging study in Mission Bay (City of San Diego, San Diego County) showed the variability of tern foraging efforts (Southwest Research Associates, Inc. 1994). The U.S. Army Corps of Engineers (1986) noted that the species was observed foraging along the banks of the Los Angeles River near the river mouth. A foraging study at three least tern sites over two years showed that greater than 80% of foraging took place within three miles of the nest sites (Atwood and Minsky 1983). The investigators also found foraging to a lesser extent up to five miles of the colony. However, it was usually (up to 90% of the time) within one mile of the coastline. The depth in these areas was no greater than 30 feet. Juvenile birds disperse from the colonies and migrate to their southern wintering grounds, therefore, forage more widely.

The brown pelican is a bird of marine habitats from open ocean to inshore waters, bays, and harbors. This species has undergone a considerable decline, first noticed in the late 1960s (Garrett and Dunn 1981). The use of organochlorine pesticides (such as DDT and its residues) and overharvesting of northern anchovies, Engraulis mordax, the major food source, have been implicated as reasons for the decline (Garrett and Dunn 1981). Pelicans commonly use undisturbed beaches, breakwaters, and jetties as resting areas and forage nearby. Pelicans must visually sight their prey fish before entering the water (Schreiber *et al.* 1975, Schreiber and Schreiber 1982). The brown pelican was observed throughout Long Beach Harbor as the second most abundant species throughout the year (MBC Applied Environmental Sciences 1984). They occur in lowest abundance in Long Beach Harbor during the winter months.

The peregrine falcon, a State and Federal endangered species, is primarily a fall transient along the coast in the vicinity of estuaries (Garrett and Dunn 1981). It has undergone a sharp decline in the last several decades, particularly as a nesting bird. For nesting, peregrines require cliff faces within range of foraging areas such as coastal estuaries, where they feed on shorebirds and waterfowl. With the addition of hacked birds (captive-bred birds released into the wild) the population of the species is expected to continue expanding. In addition to the aforementioned observation, MBC Applied Environmental Sciences (1984) reported a peregrine falcon in the nearby Shoreline Aquatic Park.

The Federal threatened Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus) nests on sandy beaches, saltpan areas of wetlands, and salt evaporation ponds from southern Washington to southern Baja California, Mexico, the Great Basin, and the Great Plains (U.S. Fish and Wildlife Service 1984b). Western snowy plovers require open sandy beaches with sparse vegetative cover for nesting. They forage for invertebrates in the intertidal zone, in dry, sandy areas above the high tide line, on salt pans, and along the edges of salt marshes and salt ponds. They are often found nesting among or in the vicinity of California least terns. Reasons for decline include human disturbance (recreational beach use including off-road vehicle use), loss of nesting habitat to shoreline development, and, at some sites, predation by a variety of birds and mammals, particularly the common crow (Corvus brachyrhynchos), common raven (Corvus corax), and the non-native red fox (Vulpes fulva). Individuals have been found on southern California beaches where some recreation and military disturbances occur (Page *et al.* 1986, U.S. Fish and Wildlife Service 1992b). Nesting would be very unlikely within the region of the proposed project area, but wintering individuals may occur. A single survey of Long Beach (undated) did not locate any western snowy plovers (reported in Page *et al.* 1986).

A single Belding's savannah sparrow (Passerculus sandwichensis beldingi) was observed in the riprap near the H.M.S. Queen Mary (MBC Applied Environmental Sciences 1984). This species is listed as State endangered and a sensitive species. Sensitive species comprise taxa for which data in possession of the Service indicates that proposing to list as endangered and threatened is probably appropriate but for which conclusive data are not available. If the subspecies was correctly identified, it is most likely a transient individual since there is no apparent habitat within Long Beach Harbor. The Belding's savannah sparrow is a year-round resident of coastal salt marshes dominated by pickleweed (Salicornia sp.) from Santa Barbara

County to Baja California (Zembal *et al.* 1988). The nearest breeding populations are at the Los Cerritos Marsh and Seal Beach National Wildlife Refuge, both less than 10 miles downcoast from Long Beach Harbor.

The light-footed clapper rail (Rallus longirostris levipes), a State and Federal endangered species, and the marbled murrelet (Brachyramphus marmoratus), a Federal threatened and State threatened candidate species, are both extremely unlikely to be present in the proposed project area. The habitat for the light-footed clapper rail is the lower littoral zone of coastal salt marshes. According to Garrett and Dunn (1981) the marbled murrelet is "generally a casual visitant to inshore waters, but with occasional invasions." There is one observation of the species for San Pedro (near Los Angeles Harbor) on December 11, 1979.

A number of other sensitive species are more likely to be present at some time during the year. These species are harlequin duck (Histrionicus histrionicus), loggerhead shrike (Lanius ludovicianus), reddish egret (Egretta rufescens), and white-faced ibis (Plegadis chihi). MEC Analytical Systems, Inc. (1988a) reported the loggerhead shrike, an upland species, as occurring on the fringe of the Long Beach Harbor area.

The western grebe (Aechmophorus occidentalis), commonly reported in Long Beach Harbor (MBC Applied Environmental Sciences 1984, MEC Analytical Systems, Inc. 1988a, pers. obs.), is listed as a Special Concern by Tate (1986). Species listed on another early-warning list as State Species of Special Concern (California Department of Fish and Game 1990) are the common loon (Gavia immer), double-crested cormorant (Phalacrocorax auritus), osprey (Pandion haliaetus), California gull (Larus californicus), elegant tern, and black skimmer (Rynchops niger). All of these species have been documented in the Long Beach Harbor area.

Mammals

The gray whale (Eschrichtius robustus), once listed as a Federal endangered species, migrates along the southern California coast twice a year from the Bering Sea to the lagoons of Baja California. They usually stay offshore; however, in the spring, juvenile whales have been observed within two nautical miles of the shore as they migrate north. The National Marine Fisheries Service delisted the species (Federal Register 59(115):31094-31095, June 16, 1994) because it has recovered to near its estimated original population size. The gray whale, however, remains protected by the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407, as amended).

Several other whale species may occur in offshore waters, but are extremely unlikely to be within the proposed project area (U.S. Army Corps of Engineers and Port of Long Beach 1995). These species, all Federal endangered and protected under the Marine Mammal Protection Act, are the blue whale (Balaenoptera musculus), finback whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Balaena glacialis), and sperm whale (Physeter macrocephalus).

Pacific harbor seal (Phoca vitulina) and the California sea lion (Zalophus californianus) commonly use the open waters of rocky coasts and harbors. According to Ingles (1965), these species feed on fish, mollusks, and crustaceans. They have been noted to use the breakwaters and buoys as haulout areas. Also expected in nearshore waters would be common dolphin (Delphinus delphis), bottlenose dolphin (Tursiops truncatus), Pacific white-sided dolphin (Lagenorhynchus obliquidens), Risso's dolphin (Grampus griseus), and shortfin pilot whale (Globicephala macrorhynchus), MBC Applied Environmental Sciences (1990). The distribution of these species is determined by food availability, noise, traffic, dredging, and other disturbances currently occurring.

IMPACTS OF THE PREFERRED ALTERNATIVE ON BIOLOGICAL RESOURCES

Without the proposed project, possible changes to the plankton, invertebrate, and vertebrate communities are speculative at best, as they are dependent upon abiotic and biotic events. These include future weather, pollution, and other stochastic events occurring within and distant to the proposed project area. The latter would be especially accurate with regard to avian resources, which usually are wide-ranging and influenced by a myriad of ecological factors.

The environmental complexities of sediment, water, and biological interactions mean that it is necessary to review and evaluate the natural disturbance regime at the proposed dredging and disposal sites. Also, an analysis of project impacts on floristic and faunal communities is needed to determine effective avoidance measures to mitigate adverse impacts on endangered, threatened, and other sensitive species, as well as their habitats.

The dredging of approximately 413 acres at depths of -59' to -69' MLLW would result in the elimination of sessile and some mobile invertebrate communities. The majority of studies conclude that a benthic community with some resemblance to the original species assemblage would likely form within a few years (*in* Nichols *et al.* 1990). Recovery would expect to vary among taxa and take a period of months to over a year to begin. Some species will become unusally abundant early in the recolonization of a disturbed area, reflecting their dependence on disturbed localities for their persistence in the local community (Thistle 1981). Thistle (1981) continues to say that as the disturbed area matures, these species abundances decline to nearly zero as the more stable invertebrate community develops. It may take three or more years for the community to resemble the pre-disturbed community. Studies using experimental dredging (Eleftheriou and Robertson 1992) and viewing colonization of artificial substrates (Moran 1991) make the same observations. Interestingly, Nichols *et al.* (1990) did not observe a benthic community impact to experimental hopper dredging in Chesapeake Bay. This may have resulted from the predominance of fine-grain sediments, lack of pollutants, and/or the estuarine environment. There are no known methods for speeding up or directing benthic recolonization towards the establishment of a specific species or even a group of such organisms.

A turbidity and sedimentation plume would be generated from dredging and material placement. This would reduce local water quality and affect fish by decreasing visibility, altering behavior, and removing free-floating eggs. Numerous models predict the behavior of dredging plumes (e.g. Kuo and Hayes 1991). Although these plumes usually disappear within a few hours after activities have concluded (Morton 1977:28, Thibodeaux, *et al.* 1978), adverse effects could still occur when they are present. Many non-mobile fauna could be smothered and potentially killed, such as polychaetes. Filter-feeding and photosynthetic-dependent organisms such as phytoplankton would also be adversely affected (Sherk 1971 *in* Johnson 1981). Since plankton blooms of one kind or another occur throughout much of the year, there would expect to be greater impacts to whatever type is largest in number during that time.

Extremely high amounts of suspended materials can suffocate fishes by clogging the gill filaments and filling the opercular cavity. Fish studied near an active dredge exhibited a marked reduction in general swimming activity, social dominance patterns were modified, and the fishes frequently engaged in "coughing" and gill scraping behavior in an attempt to free the gills of accumulated particulate material (Everhard and Duchrow 1970, Environmental

Protection Agency 1976 *in* Johnson 1981). The intake velocity of the suction head would obviously influence the capability of fishes to avoid or escape from the dredge suction head.

The relatively deep depth of the dredging would not be expected to impact sight-feeding birds such as the brown pelican and California least tern since the turbidity plume is not expected to reach the surface due to the depth and lack of upwelling currents. However, placement of material could create a surface turbidity plume. This would be most likely at the Los Angeles Pier 400 location, which is in water of -30 feet MLLW or less.

Dredging activities may also disrupt or "break up" schools of fish that are important prey items for the brown pelican. Once schooling fish are disrupted they may swim deeper, thus making themselves unavailable as prey items for the pelican, or become so disjunct from their normal schooling patterns that pelicans may have to expend much greater energy to capture an individual prey item. This potential of a reduced food supply during the months that dredging would be conducted may be significant to this species, particularly juvenile pelicans, which have a first year mortality rate of 70 percent (Schreiber and Mock 1988). This may be due in part to the known poorer foraging success by juvenile birds (Carl 1987).

Noise created during activities would have negative impacts on fish, marine mammals, and seabirds in the vicinity, depending upon intensity and duration. Richardson (1990) observed reactions by bowhead whales (Balaena mysticetus) to recorded dredge noise at distances ranging from 2-7 miles. He pointed out that sensitivity among individuals differed and there was likely some habituation to the noise.

Despite assertions to the contrary (U.S. Army Corps of Engineers and Port of Long Beach 1995), the proposed project could increase boat traffic through the Queens Gate Channel if the port is made more attractive to commercial shipping interests and human population in the region continues to expand as expected. Thus, associated increased disturbance may cause forage fish species to disperse, indirectly affecting piscivorous birds that rely upon schooling fish for food, as well as other species.

Filling of the Long Beach Main Channel pit with dredge material would bring the elevation of this site to near the surrounding area. During material placement, pit sediments could be resuspended into the water column, and pit water could be dispersed out over the adjacent bottom. This water would most likely be anoxic, thereby, killing adjacent benthos. Scientific data on the resuspension issue are glaringly lacking. Studies of similar sites within the project area and New York Harbor indicate that the biological communities extant within these pits are depauperate. The establishment of a diverse benthic community on the relatively clean dredge material would be considered a positive effect. The presently contaminated sediment sinks that are thought to occur in such pits would be eliminated (Odum 1970).

A potential indirect effect is the possible disturbance to brown pelicans on the middle breakwater during the dredging operation. This would represent a cumulative impact on the brown pelican from breakwater and dredging projects at Oceanside Harbor, Redondo Beach-King Harbor, Ventura Harbor, Carlsbad, and Santa Monica Bay proposed by the Corps.

SUMMARY

The Service is in concurrence with the Corps' preferred alternative if the recommended mitigation measures listed below are implemented.

RECOMMENDATIONS

The Service believes that incorporation of the recommendations presented below would offset project induced losses to fish and wildlife and avoid impacts to Federal threatened and endangered species to the maximum extent possible. If recommendations pertaining to listed species are not adhered to by the Corps or their contractor(s), the Corps should contact the Service and request consultation pursuant to section 7 of the Endangered Species Act of 1973, as amended. If the proposed project significantly changes in design, please notify this office so we may advise you if a new or revised Fish and Wildlife Coordination Act Report is necessary.

1) We recommend that the Corps follow the recommendations of The Interagency Working Group on the Dredging Process (U.S. Department of Transportation 1994). In particular, there is a need for a regional dredged material management plan that would coordinate the many on-going and planned dredging and beach replenishment projects in the Los Angeles District. We believe that there will be long-term reduction of costs with implementation of this recommendation.

2) We recommend that the Corps restrict the discharge of dredged material to the period November 16 to March 15. This would completely eliminate conflicts with the California least tern and reduces them insofar as possible with the brown pelican.

3) We recommend that if the preferred alternative cannot be carried out during the time period in recommendation number two, the Corps further avoid or minimize turbidity and sedimentation. For example, silt curtains should be used to reduce the turbidity plume at the point of dredge material disposal. We believe that limited additional direct costs will result from this recommendation.

4) We recommend that the Corps maximally reduce noise and disturbance during dredging and disposal activities. We believe that no additional direct costs will result from this recommendation.

5) We recommend that the Corps monitor possible movement and dispersal of contaminants and pit water from the proposed disposal areas into adjacent areas outside the pits after the placement of dredge material. The cost of this recommendation depends upon the scale of the sampling effort and the vessel used. Current cost of analysis for organocholorines, PCBs, organophosphates, hydrocarbons, butyltins, and grain size is about $1,500/sample.

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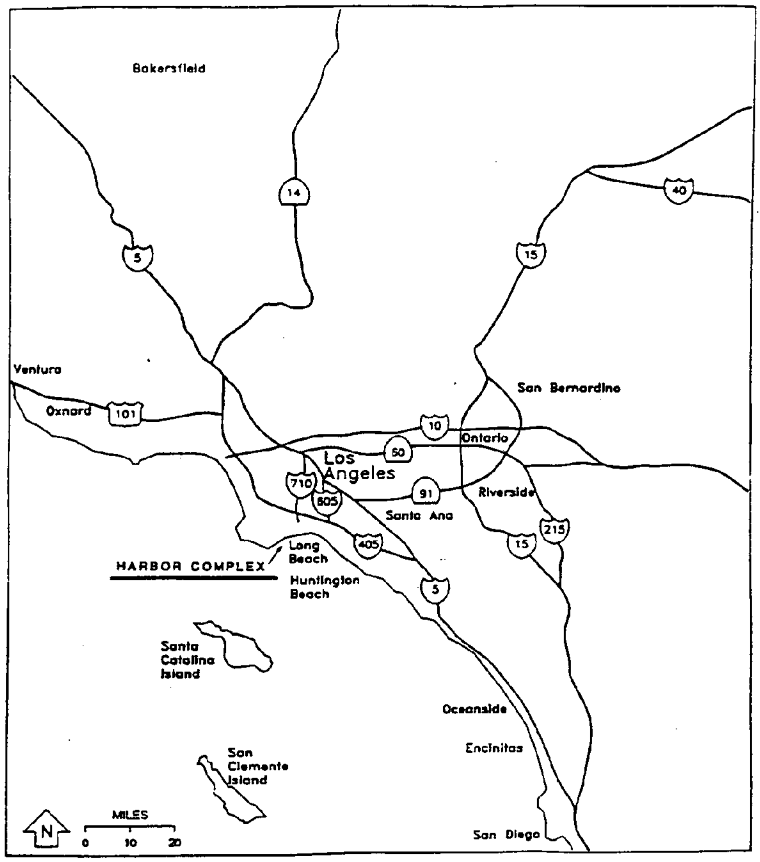


Figure 1. Regional map of the Greater Los Angeles area. The "Harbor Complex" contains both the Los Angeles and Long Beach Harbors.

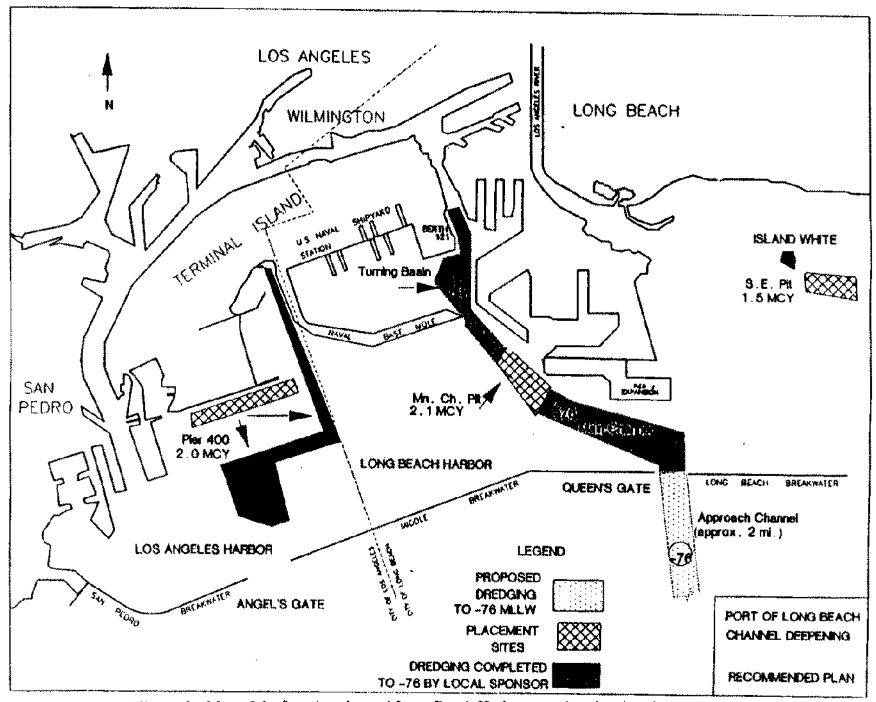


Figure 2. Map of the Los Angeles and Long Beach Harbor complex showing the proposed dredge and disposal sites for the Port of Long Beach Channel Deepening Project

Appendix F

MACFARLANE ARCHAEOLOGICAL CONSULTANTS
7290 Marmota Street
Ventura, California 93003
(805) 659-2657

March 28, 1995

STATISTICAL RESEARCH INC.
2500 N. Pantano. Suite 218
Tucson. Arizona 85751

Attn: Jeff

Cultural Resource Investigation - Underwater Remote Sensing Survey
For the US Army Corps of Engineers, LA District
Environmental Planning Division
Contract No. DACW09-94-D-0014

In Support of Proposed Beach Nourishment
Nearshore Dredge Area
Long Beach Harbor, Los Angeles County, California
Delivery Order No. 0008, dated February, 1994

Ladies & Gentlemen:

This letter constitutes a preliminary letter report of the results of the field survey and literature research conducted for the above referenced dredge materials area. A hard copy of this report is being sent which will include the data reduction/shiptrack map of the individual project areas. A fax copy of this report is being sent directly to the COE to help meet their dredge contractual deadlines.

Field surveys. literature research and data reduction for the above referenced project is complete. Some additional data reduction to prepare a more accurate representation of magnetic sources is in preparation. Magnetic anomalies reported in this letter should be considered tentative until confirmed although no discrepancies have been noted to date.

Literature Research

Shipwrecks reportedly lost in the project vicinity are presented in Table 1 (Attachment 1). Coordinates for shipwrecks are in general approximations but do place several of them in the project vicinity. In addition, several locations reported as "accurate" or "accurate within one mile" also occur. Shipwrecks for which coordinates are reported as "accurate" are designated as "archive sites" and include the following:

MMS 062 (MV 77454) *Casino [James Tuft]*, a moderately significant 1274-ton 4-masted barkentine built in 1901 which was later converted to a barge for gambling. Dimensions of the vessel are listed as length 215 ft., breadth 42.5 ft., depth 17.4 ft. The vessel was reported burned to the waterline and beached at Terminal Island. Later it was towed 6 miles off Long Beach.

MMS 415 (possible MMS 349), MV 5182 *Cricket No. 1*, a culturally significant 46 ton wooden steam sidewheeler built in 1863 and lost near Long Beach in 1985. Dimensions for the vessel are given as lenth 92 ft., breadth 16 ft., depth 4.9 ft. The vessel was brought to Long Beach Los Angeles Harbors by Phineas Banning who used the vessel to travel to Catalina Island and to "tow lighters" within the harbor. Coordinates reported as "accurate" place the vessel within the project area at a water depth of 70 ft. Pierson (1980) reports the vessel has been subject to illicit pilferage. Coordinates also match that of an "unknown steam sidewheeler" reported lost off Long Beach at the same location.

MMS 115, MV 246362 *Esperia III*, an culturally insignificant 110-ton diesel powered vessel (oil screw) built in 1944 and lost when it struck the eastern Long Beach Harbor breakwater January 25, 1952. Construction and dimensions of the vessel are not presently known.

MMS 160/161, MV 215021 *Johanna Smith*, formerly known as the Yamuri, a moderately significant 1921-ton steam powered lumber schooner built in 1884 and reportedly used to haul lumber to the study area in 1917 and lost when burned near the entrance to Long Beach Harbor on July 21, 1932. Coordinates reported by Pierson (1980) as "accurate" place the vessel near the project area at a water depth of 60 ft. Coordinates reported as "accurate" place a steel vessel used as a gambling ship known to informants as "the gambler" in the same vicinity. The vessel was converted to a barge and used for gambling offshore Long Beach Harbor. Dimensions of the vessel are listed as length 257 ft., breadth 50.5 ft. and depth 15.4 ft. Additional information also reported by Pierson (1980) place the vessel about 12 miles offshore of Long Beach at a water depth of 135 ft.

MMS 255 (possibly 470), MV 231469 *Pierpont*, a culturally insignificant 12-ton diesel powered passenger vessel built in 1947 and stranded at Long Beach October 17, 1951. Dimensions of the vessel are listed as length 67.9 ft., breadth 22.1 ft.and depth 4.5 ft. Coordinates reported by Pierson (1980) as "accurate" place the vessel within the study area.

MMS 507, an unknown barge used for bait fishing which broke-up during a storm at Long Beach when currents reported dragged it near the Queengate entrance. A Long Beach informant indicated in 1989 that the vessel is believed to be have a wooden frame with nets and pontoons (steel drums).

Other vessels for which relatively "accurate" coordinates are not available which may be within the study area include the following:

MMS 26, MV 217610 *Annie M. Rolph*, a moderately significant 1393-ton 4-masted barkentine built in 1919 and used to haul freight until it foundered on the beach and was destroyed. Dimensions of the vessel are length 281.4 ft., breadth 43.5 ft. and depth 18 ft. While coordinates place the vessel within the study area informants place the wreckage at Rocky Point off Palos Verdes.

MMS 41/359. MV 235719 *Benita*, a moderately significant 161-ton deisel powered vessel built in 1936 and reported as sunk in 1951. Dimensions of the vesssel are listed as length 83.8 ft., breadth 22.1 ft. and depth 8.4 ft. While coordinates place the vessel within the study area, informants place the wreckage at Point Fermin.

MV 205185, *Brother Jonathan*, a 9-ton diesel powered vessel built in 1908 and foundered 2000 yds southeast of the east end of the Long Beach Breakwater April 24. 1964. The significant of the vessel has not been formerly determined, however, vessels under 9-tons have been previously listed as insignificant. Dimensions of the vessel have been listed as length 39.9 ft., breadth 22.1 ft. and depth 8.4 ft.

MV 202817. *Camiquin*, a 13-ton gasoline powered vessel built in 1906 and lost at the Long Beach Harbor entrance August 23, 1923. Significance of the vessel has not yet been determined. Vessel dimensions are given as length 54.2 ft., breadth 12 ft., depth 3.3 ft.

MMS 256. MV 125415 *Centennial* [aka *Pirate Galleon, Redoubtable*], a moderately significant 1286-ton wood 3-masted ship built in 1875 and converted to a pleasure ship. a barge, a gambling ship and a movie ship burned 1.5 miles off Long Beach for a movie (Paramount Studios) in July 29, 1930. Dimensions of the vessel are length 36.7 ft., breadth 11.6 ft. and depth 4.9 ft. Extensive salvage and illicit pilferage of the vessel has been reported (Pierson, 1980).

MMS 153-154. MV 100721 *Irene*, a moderately significant 772-ton 4-masted schooner built in 1900. later converted to a barge, and lost off Long Beach November 1. 1929. Dimensions of the ship are listed as length 186.4 ft., breath 39.7 ft. and depth 14.3 ft. The *Irene* is reported to have been removed or refloated.

MMS 712, MV 150469 *Pinole*, a culturally insignificant 84-ton gas powered schooner built in 1889 and burned by the fire department within the LALB harbor in January 1945.

Data Reduction and Results

Both potentially significant and insignificant seafloor features of cultural origin were tentatively identified within the study area.

Archive sites represented in the study area include two rock piles previously identified as LB-17 and LB-18 (Hunter and James, 1989; MAC 1990). Remains of a small vessel about 35 ft. in length is associated with the LB-17 location. These areas are represented by seafloor targets 10 and 17.

Potentially significant cultural features are those evaluated as potential shipwreck localities or sites. One such feature was identified during the present survey. It is identified as seafloor targets 2 (represented by an area of scattered linear debris and coincident

Significant errata: page 4 Paragraph substitution.

Potentially significant cultural features are those evaluated as potential shipwreck localities or sites. One such feature was identified during the present survey. It is identified as seafloor targets 2 (represented by an area of scattered linear debris and coincident magnetic components). Both extent of wreckage and amplitude of magnetic anomalies at this water depth (about 65 ft.) are consistent with a vessel such as the significant *Cricket No. 1*. In order to test the "accurate" coordinates of the cricket, the vessel ran a sidescan line in the vicinity of recorded coordinates. During the survey no remains were observed in sonar records at that location although a "buoy" was located in the general vicinity of these coordinates, which indicates the coordinates recorded as "accurate" are suspect due to navigational errors. Further research is underway to identify the purpose of the buoy at that location. Other shipwreck coordinates in the near vicinity include the moderately significant *Joanna Smith, Irene,* and *Centennial* as well as vessels evaluated as insignificant MMS 507 (bait barge), *Pinole, Pierpont,* and *Esparia III* . Further research is required to visually identify these remains as one of the vessels recorded for this vicinity.

magnetic components). Also identified as possibly of cultural origin and possibly related to an shipwreck site evaluated by MMS as insignificant is target 3 (represented by an area of scattered circular objects one or more of which may represent steel drums which may have been deposited on the seafloor as the result of the break-up of a bait barge reported lost near this location and coincident magnetic component). In addition to these two localities, it should be noted that the shipwreck site located near the LB-17 location has never been evaluated. Sidescan sonar images of this vessel have always been at the edge of sonar records and a clear image of the site has never been recorded. Based on existing images, the site was tentatively identified as a small (about 35-40 ft. long) vessel probably less than 10-tons and most likely insignificant in terms of cultural resource evaluation (MAC, 1990).

Insignificant cultural features include buoys, seafloor cables as well as "rock piles" which represent materials most likely used for breakwater construction or repair which have been deposited in error on the seafloor. These include a small anchor (not mapped) located prior to the beginning of line 12, a buoy on line 9, 5, 6, 13, 18, 19, 20, 25 as well as previously recorded archive sites cited above.

Also evaluated as insignificant are small seafloor features without coincident magnetic anomalies which may represent natural seafloor. These features are identified as targets 1, 4, 7, 8, 9, 11, and 26.

Also evaluated as insignificant are small features with and without coincident magnetic anomalies but having insufficient horizontal extent to represent wreckage or other large debris. These are interpreted as most likely representing jetsam accidentally or purposely deposited from passing vessels. These features are identified as target 12 and 24.

Magnetic anomalies for which their is no visible surface expression are evaluated as having unknown origin but potentially insignificant. Anomalies include targets 14, 15, 16, 21-23, 27-31.

All of these features are presented in Table 2 (Attachment 2) and their locations plotted in Plate 1 (2 of 2).

Impact Assessment

Dredged materials excavated at this location may result in (1) adverse impacts to potentially significant historic archaeological site or sites, in that dredging may remove or uncover potentially intact and significant sites. Exposure of wreckage may result in increased predation by boring clams (shipworm), wind and wave action as well as salinity and other chemical changes which may increase oxidation of metallic components and subsequent degradation of the wreck site.

Conclusions and Recommendations

Data reduction and interpretation resulted in a list of seafloor features and magnetic anomalies identified in the survey area which are presented in Table 2 (Attachment 2). A reduced copy of our draft map (Plate 1(2 of 2)) is attached. This map and the contents of Table 1 contain confidential materials which should not be distributed. COE Archaeologist R. Perry has been sent a copy of all tables and plates. One potentially significant cultural features were identified as the result of the remote sensing archaeological survey. As culturally significant sites or artifacts are located within or directly adjacent to the survey area, impacts to such resources are anticipated to occur as a result of the proposed project.

It is in the best interests of historic preservation, therefore, that prior to any dredging of materials in the survey area, additional visual identification of the potentially significant debris identified as target 2 via diver and/or ROV survey should be required and that any historic locations identified through such survey be evaluated for eligibility for inclusion in the National Register of Historic Places. At the time the site is relocated using sidescan sonar, we also recommend that although at the edge of the survey area, that the shipwreck located near LB-17 be relocated and a good sonar image of the vessel be obtained sufficient to determine vessel size, and verify relative recent age and small size of the wreckage.

It should be noted, that while tentatively sites may be identified as potentially eligible, based on relocation and visual observations, that actual eligibility determination may require more intensive data recovery efforts in the form of limited excavation of remains. ROV and diver visual identification survey should be sufficient, however, to determine whether such Phase 2 analyses should be required.

Should you have any questions regarding the results of the survey or recommendations contained herein please contact me. At the request of R. Perry we are faxing an estimate for the archaeological relocation and visual identification survey. Also at the request of R. Perry we are including examination of target 3 in this estimate.

Yours truly,

Heather Macfarlane
Archaeologist

Attachments

cc: Richard Perry, LADCOE

CONTAINS CONFIDENTIAL INFORMATION (NOT FOR DISTRIBUTION)

Table 1 Shipwrecks Reported Lost in the Vicinity of Long Beach, California

Lloyds Merchant Vessel Registry	MMS No	Other Notation	Salvage	Accuracy	Source	CR	Name	Date Built	Vessel Statistics Construction/Rig/Service /Size	Tons	Date Lost	Month/ Day	Latitude/Longitude	Depth	Loss Situation
255123	1			C	2	3	Ace #1	1944	Brg./LCI conv.	96	1948	4/29	33 45 118 11	10	Foundered Dana Point
228952						4	America IV	1918	Ol.S./Fsh. 45.2x11.8x4.7	16	1948	1/11			Foundered 1mi E of West of LB Bkwtr
217610	26			E	2	2	Annie M Rolph	1919	Brk./4-Mstd/Frt. 281.4x43.5x18	1393	1942	7/25	33 42 118 10		Foundered,beached,destro Rocky Pt., Palos Verdes
542173						4	Bean I	1972	Ol.S. 52x19.1x4.7	14	1972	11/13			Destroyed by storm at Lo Beach
235719	41	MMS 359		E	2	2	Benita	1936	Ol.S. 83.8x22.1x8.4	161	1951		33 41 118 11		Point Fermin
205185						4	Brother Jonathan	1908	Ol.S. 39.9x12.4.5	9	1961	4/24			Foundered 2000 yds SE/E LB Bkwtr
202817						4	Camiguin	1906	Ga.S. 54.2x12x3.3	13	1923	8/23			LB Harbor Entrance
77154	62			D	2	1/2	Casino [James Tuft]	1901	Brk/4mstd[Brg Conv]/Gambling 21.5x42.5x17.4	1274	1935	8/22	33 42 45 118 10 30		Burned,beached T.I./(Tow 6mi.off LB)
125415	256		E, P	C	2,6,7	1/2	Centennial [Pirate Galleon, Redoubtable]	1875	Wood, 3-Mstd. Ship/Conv. Pile Ship/Brg.Conv./Gambling Movie Ship	1286	1930	7/29	33 42 118 10 33 45 118 10		Towed 6 miles off Long Beach; burned for movie t waters edge; 1.5 miles off
206105	77		R/R	E	2	3/4	Continental [Continental Freighter]	1909	Ga.S./Frt. 36.7x11.6x4.9	10	1930		33 40 118 10		Near L.A.
5182	415	MMS 349	P	A	6	1	Cricket No. 1	1863	St.P./Sidewheel/Lighter 92x16x4	45.9	1885		33 46 118 15 33 42 10 118 11.5	20 30	Accurate Location
175287	58						C.C. Co. 26	1941	Wood Brg.	111	1961	4/18	33 43 118 5		
220312	93			E	2	2,4	Diamond	1920	St.s./Ga.S./Fsh. 67.4x16.4x7.2	650 50	1926 1925	4/02 4/13	33 40 118 10		Collided w/Fr. Stmr. India 22 miles south of San Ped
235382	95			E	2	3	Discovery	1936	Ol.S./Fsh.78.3x22.8x9.8	123	1955	12/20	33 30 (40) 118 10		Burned 15mi off Los Ange Light
225389	529	MMS 100	R/B	E	6	2	Eagle	1927	Ol.s./Frt. 105.1x14.5x8.2	77	1932	9/29	33 46 16 118 12 (15) (28)		Burned off Ft. 7th St. Lon Beach, no lives lost
236387	102		R/R	E	2	2	El Padre	1937	Ol.S./Fsh. 75.4x21.1x9.7	107	1951	12/22	33 40 118 10		Sunk at Los Angeles (May same as L Padre, Pt. Dum
219955						4	Elena T.	1946	Ga.S./Fsh. 94.3x13x4.1	16	1946	12/19			Stranded at Belmont Shore
262291	106			E	2	3	Elsie II [LCI-L-797, USN]	1944	Steel Brg./Pas. 149.8x23.2x3.6	85	1956	12/03	33 44 118 5		Stranded at Long Beach
253888						1	Emerald Spray	1938	Ol.s.	55	1950	4/23			Lost enroute Honolulu to L Beach

216362	115			D	2	3	Esparia III	1944	Ol S	110	1952	1/25	33 43 20 118 10		Struck E LB Harbor Bkwt
218253	111	Off Chart		E	2	2/3	Esparta	1945	St.S./Fuel Oil/Frt 433x61.2x15.9	7074	1952		33 44 118 12		Long Beach (May be expe 811)
210153						4	Fantastic	1917	Ol S./Fsh. 43x12x4.1	20	1954	3/28			Foundered S. End of LB I
526292						4	Fern I	1970	Steel Ol S.61.5x20.3x1.7	14	1972	11/11			Foundered 600 yards southwest of LB jetty
106321	123		P	E	2	2	Fox [Allen A]	1888	Brg.Conv. 145x35x9.4	342	1930		33 43 34.8 118 8 34.8		Abandoned, Long Beach
	123	Lloyds 343	P	E	2	2	Fox	1883	Wood Sail, Schr/3Mstd.1Dk, 96.4x22.5x10.2	343	1930		33 43 35 118 8 35		Abandoned, Los Angeles
201161	520	MMS 350	E/R/R	A	3,6,9	2/3	F.S. Loop	1907	Steel Sch/St.S.Conv./Ga.S./Fsh 193x39x13.6.	794			33 42 54 118 15 59	52-55	Fire off Pt. Fermin, ran to Beach (aka 7 Minute We MMS 350, Rebuilt by J Hazeltine)
169266	118			C	2	2/3	F.S.C. 1 [F.S. Cooper]	1925	Wood Brg. 63.9x29.8x3.2	62	1958	2/08	33 45 118 9		Foundered at Belmont Sh Mooring; removed outside Harbor; Pierson Locus 17
.					3	1	Gambler		Steel	60					Outside of Outer Harbor, Destroyed for Movie (Thu
	557			C	6	2/4	Georgia Straits		Tug				33 40 118 10		Within 1 mile
100766						4	Independence	1902	Ol.S./Tow/Msc. 38.7x13.1x3.8	13	1953	9/23			Grounded 1000 yds east o Belmont Pier, Belmont Sh
100189	150			D	2	1/2	Indiana	1876	Wood Ship/Fsh. 208.9x40x23.9	1487	1936	3/12	33 45 118 11		Stranded, Previously burn on Harbor Day
100721	153	154	R/R			2	Irene	1900	Sch/4Mstd/Brg. Conv. 186.4x39.7x14.3	772	1929	11/01	33 43 118 10		Off Long Beach (MMS 15
232689						4	Jackie	1933	Ga.S./Fsh. 47x6.9x5.5	16	1935	1			Burned at Long Beach
77528	540					3	Jas F. McKenna	1902	Ga.S./Scow/Frt. 78x27.6x6.3	95	1960	3/10	33 43 118 10		Foundered 11 mi. S Long Beach
215021	161	MMS 160	E			2	Johanna Smith	1917	Sch/St.S.Lmbr/Brg/Frt./ Gambling, 257x50.5x15.4	1921	1932	7/21	33 43 10 118 10 38	60	Burned Near entrance to l Harbor
215021	160	MMS 161	D			2	Johanna Smith [Yamuri]	1884	Sch/St.S.Lmbr/Brg.Conv./Frt./Gambling	1888	1932	7/21	33 40 118 10	135	At anchor 12mi offshore l Beach at Horseshoe Kelp
307	164	Lloyds 371	F			2	John Ena	1892	Steel Brk /4Mstd. 312.9x48.1x25	2812	1932		33 45 118 10		Los Angeles
211510	165					2/3	John H. Marion	1943	St.S./Fuel Oil/Frt. 422.8x57x34.8	7213	1946		33 45 118 9		Near Long Beach
258319							Julia	1943	Ga.s.	15	1949	12/28	33 31 30 118 9 30		
110997	Confirm?					4	Lark	1888	Ga.S. 31.5x12.8x3.9	9	1918	9/25			Grounded LB Harbor
	107	MMS 187				2	Lily	1882	Schr./2Mstd. 102.5x28.8x8	149	1935		33 45 118 13		Long Beach, Movie Ship I Bounty
140179	192	Lloyds				2/3	Lottie Carson	1881	Schr./3Mstd/refit	295	1940		33 40 118 5		Los Angeles

111201	191	S94		2/3	Louise	1892	127.3x32.8x8.8 Schr./Yct. 150x35x10	345 (346)	1912		33 46 118 4	Cerritos Channel, Los An Hbr., sold to Costa Rican Registry
167327	191			2	L.A. Tuna Canning Co. #1	1915	Brg. Unrigged MV	130	1921	2/18	33 59 118 29	Long Beach, Ocean Park
227568				4	Mardi Gras	1928	Ga.S./Fsh. 43x9.9x5.7	12	1951	10/31		Foundered at mooring ins Fed Bkwtr, Long Beach (
268661				4	Maui	1943	Ol.S. 106.7x17.9x9.3	139	1977	5/07		Foundered Long Beach
258577				4	Michael H.	1943	Ga.S./Fsh. 401.x10.7x4.7	12	1955	11/10		Stranded off LA/LB bkwt
286230				3	Mogul [YTB-264,USN]	1945	E.O./Tow 102.8x27x13.8	233	1984	6/23		NW Corner, LB Harbor
		LBP-T-32		4	Montfalcon	1917	'Brg./Gambling		<1932			Off Bixby Park, LB
278355	217			3	Navajo [YTL-310, USN]	1944	Ol.S./Tow 63x17.8x8.3	55	1963	7/09	33 35 118 10	Abandoned at sea off coa SP, Calif.; Cause unknow
130502				4	Nellie	1880	St.S./Ga.S.Conv./Pas. 57x17.5x4	43	1907			Long Beach, Built SF
	649	Chk MV		4	Nicholas Bidwell	1837	Ship	833	1876	2/09	33 118	Ran ashore in storm at Anaheim
175893	547			2	Oregon Trader	1943	Brg.	861	1949	12/14	33 45 118 11	Foundered 500mi off Long Beach
292566				4	Pandora	1963	Ol.S./Yct. 40.7x13x6.8	19	1978	2/06		Burned in vicinity of LA/I
166379	531			2	Paproco #2	1916	Brg./Unrigged MV	91	1917	12/14	33 45 118 11	Stranded Long Beach
231469	255			2/3	Pierpont	1947	Ol.S./Pas. 67.9x22.1x4.5	12	1951	10/17	33 43 6 118 11 7	Accurate within 1 nautical mile. Accurate
	470			4	Pierpont Queen						33 43 47 118 11 42	Accurate
150469	712			3	Pinole	1889	Schr./Ga.S./Msc. 72x25.4x6.5	84	1945	1	33 43 118 11	San Pedro Harbor, Burned Fire Dept.
	659			2	Pliny		Steamship		1854	5		Long Beach
224001				4	Point Loma	1924	Ga.S./Pas. 48.5x10.2x4.9	13	1941	11/27		Long Beach
171688	534		D/R	2	R.C. Co.#6	1934	Scow/Frt. 125x38x10.8	490	1943	1/23	33 45 118 11	Stranded/Grounded/Disma d at Long Beach
574896					Shar Ron	1954	Ol.s.	35	1976	12/24		Burned Southwind Marina Long Beach
265330				4	Sur Fish	1953	Ol.S./Pas. 56.3x13.3x3.1	13	1962	9/07		Collided with Long Beach Bkwtr
259412				4	Suzi	1914	Ol.S.	10	1951	11/29		Foundered at achorage, B 20, Pier C, LB
223507	331			2	Swallow	1918	Ga.S./Yct. 105.4x14.5x8.8	91	~1926	11/30	33 44 118 10	Exploded at Standard Oil Dock, LA
238130					Tuna Express	1939	Ga.s.	13	1913	4/08		Foundered Long Beach, O Park Pier
	312			1	UB 88	1923	Kaiser's submarine, WWI	800	1923	1	33 39 118 10	Purposely sunk by Destroy Wicks'
	567				Unknown						33 37 53 118 11 48	

		Possibly Cricket No. 1			Unknown "14 Minute Wreck"	c. 1800's	Wood Sl p.					Off Long Beach
		SLC		3	Unknown		Iron box w/ bulkheads, ladders, bent pipe			33 41 55 118 9 33 1	82	
	521			3/4	Unknown					33 43 33 118 6 22		Near Anaheim Bay, Lon Beach
	523			4	Unknown					33 43 35 118 6 22		Near Anaheim Bay, Lon Beach
	685			4	Unknown						16	S. Belmont Pier, Long Be
	507			4	Unknown		Brg /Fsh /Bait			33 43 9 118 10 38		Location accurate to 1 mile
					Unknown "Gambler"		Steel					Off Long Beach
	522			3/4	Unknown					33 44 54 118 8 46		
				4	Unknown					33 42 30 118 9 9		
	467			3	Unknown					33 42 26 118 9 9		
	501		R/R	3	Unknown		Brg.			33 39 42 118 3 31		
		Possibly Cricket No. 1		4	Unknown "Steam Sidewheeler"		Sl p.			33 42 10 118 11 5		
	500	508	R/R	3	Unknown		Steel			33 44 118 6		
		SLC		3	Unknown Debris		Container Trailer, upside down			33 41 55 118 10 17 4	72	
		SLC		3	Unknown Debris		Container shoaled into seafloor			33 43 12 118 6 49.9	36	
	467				Unknown obstruction			1946	2/28	33 42 26 118 9 9		
	574		P	2	Unknown Wreckage		Unkn./Wreckage			33 41 118 13	80	
DD 277	403			3	U.S.S. Moody	1918	Destroyer	1933	11/-	33 37 28 118 12 5	145	Off Los Angeles in two p

Job: LADCOE Client: Statistical Research Inc. Area: Queensgate SSS: Klein Dual 100/500 kHz 50 meters/Channel Ant.Layback: 40 ft.
Fix Pts.200 ft. Mag.: Geometrics 866 Scale: 100/1000 gammas Sensitivity: 1 gamma Rate: 1 Second

Table 2. Seafloor Features and Anomalies

Target No.	Line No.	Cable/ Out (ft.)	Fix Pt.	Slant Range (meters)	S/P	Water Depth (feet)	Mag. Anomaly (Gammas)	Duration	Description	Significan e
Not Mapped	12	125	Prior to BOL	N/A	N/A	Pending	N/A	N/A	Small anchor feature	Insignifica cultural feature
Buoy	9	100	13.0	N/A	N/A	Pending	6 gammas	10C ft.	Near breakwater	Insignifica cultural feature
1	1	30	32.25	N/A	N/A	Pending	20 gammas @ 30	100 ft.	10 .x 3 ft. linear feature in depression	Insignificar
2	15	125	4.7-4.9	0-10	P	Pending	N/A	N/A	Angle shaped feature (Leg A = 12 x <3 ft.; Leg B = 36 x 3 ft.	Potentially Significant Cultural Feature: Shipwreck
2	15	125	4.8-4.7	15	P	Pending	N/A	N/A	15' x 1m. x2 m. uncorrected height above seafloor.	
2	1	30	29.8-30.4	10-50	S	Pending	N/A	N/A	Linear debris; scattered linear features 1400 ft. south of above target	
2	1	30	30.4	30	S	Pending	N/A	N/A	60'x1m.x2m. height above seafloor 25'x1m.x1m.	
2	1	30	29.9	10	S	Pending	N/A	N/A	20' rectangular box, interior shadow, 2m. above seafloor height	
2	1	30	31.5	N/A	N/A	Pending	30 gammas	100 ft.	Ferrogmagnetic source	

2	2	100'	30.05	15	S	Pending	N/A	N/A	Large semi-circular element of debris in 10' deep depression. 6.0 m. long x 2m. and 1 m. above seafloor height.	
2	2	100	30.35	10	P	Pending	N/A	N/A	20' x 1 m.	
2	2	100	30.45	5	P	Pending	N/A	N/A	20' and 10' long elements in alignment	
2	2	100	30.5	0-13	S	Pending	N/A	N/A	Perpendicular elements 30 x 1.5m., two 12 m. long elements, 1 circular element 5'x2m. with interior shadows	
2	4	100	31	N/A	N/A	Pending	7 gammas	100 ft.	Ferromagnetic source	
2	6	100	32	N/A	N/A	Pending	5 gammas	100 ft.	Ferromagnetic source	
2	6	100	29	N/A	N/A	Pending	8 gammas	100 ft.	Ferromagnetic source	
2	7	100	32.5	5	P	Pending	N/A	N/A	Three parallel linear features	
2	2	100'	31.4	35-40	P				Scattered linear debris 10mx1m. x 1m.	
3	1	30	21.8-23	0-10 0-20	P S	Pending	N/A	N/A	18 scattered circular features, possible debris with coincident bottom change (hard bottom/rock outcrop). Possibly represents 55 steel drums used as flotation for bait barge missing just outside harbor.	Possibly cultural feature; Insignifican
3	1	30	21.0	N/A	N/A	Pending	8 gammas	100 ft.	Ferromagnetic source	
3	2	100	26.7	30	S	Pending	N/A	N/A	5'x1m.x1m. circular shadow; scattered circular elements (coincident with hard bottom/rock outcrop)	
3	2	100	23.4-18.0	0-50	P S	Pending	N/A	N/A	Scatttered cirular elements (coincident with hard bottom/rock outcrop)	
4	1	30	19.8-20.1	5-30	S	Pending	N/A	N/A	Scattered features (coincident seafloor change, hard bottom/rock outcrop)	Insignifican
4	1	30	18.9-19.1	0-30	P S	Pending	N/A	N/A	Coincident seafloor change	
5	1	30	9.7	40	S	Pending	N/A	N/A	10x2x5 Buoy near Breakwater	Insignifican, cultural feature

444

6	1	30	1.0	30-37	S	Pending	N/A	N/A	Parallel linear features in cabling area	Insignifican cultural feature
6	1	30	5.9	N/A	N/A	Pending	9 gammas	100 ft.	Ferromagnetic Source	
7	3	100	59.0	25	S	Pending	N/A	N/A	Small target with square shadow; 5 ft. square. shadow;	Insignifican
7	3	100	63.2	5	P	Pending	N/A	N/A	16 x 13 x 3	
7	11	125'	3.85	35 45	S S	Pending	N/A	N/A	Two objects and small scatter with no apparant height above seafloor; 20'x 6.x13 ft. uncorrected height above seafloor and 1m sq.; same targets as above.	
8	12	125	5.15	15	P	Pending	N/A	N/A	1 m. square object; possible small rock	Insignifican
9	14	125	5.9	10	S	Pending	N/A	N/A	Small rectangular features with interior shadow 6.5 x 2 x 3 ft. uncorrected height above seafloor; 13 x 8 ft. in depression	Insignifican
9	1	100	40.3	15	P	Pending	N/A	N/A	Small rock pile	
10	9	100	14.5	20-28	S	Pending	N/A	N/A	Complex feature associated with rock pile; possible cultural feature 35 x 3-13 x 3-13 ft. above seafloor. LB-17 Rock Pile and associated small vessel with coincident ferromagnetic source (MAC. 1990).	Cultural but insignifican
10	9	100	13.6	N/A	N/A	Pending	10 Gammas	100 ft.	Ferromagnetic source	
10	7	100	14.0	N/A	N/A	Pending	5 gammas	100 ft.	Ferromagnetic source	

445

11	11	125	8.0	0-3.0	S & P	Pending	N/A	N/A	Rock outcrop pile 100 ft. diameter	Insignifican
12	8	68.9	—	—	—	Pending	N/A	N/A		Insignifican possibly cultural feature
12	9	100	1.0	N/A	N/A	Pending	3-5 gammas	100 ft.	Ferromagnetic source	
13 Buoy	13	125'	7.25	48	S	Pending	5 gammas 32/15 gammas	100 ft.	Buoy and anchor. Located near reported Cricket coordinates. Check buoy identification.	Insignifican cultural feature
14	4	125	46	N/A	N/A	Pending	6 gammas	100 ft.	Unknown ferromagnetic source	Unknown
15	3	68.0		N/A	N/A	Pending	6 gammas	100 ft.	Unknown ferromagnetic source	Unknown
16	4	69.0		N/A	N/A	Pending	5 gammas	100 ft.	Unknown ferromagnetic source	Unknown
17	17	125	98.25	5	P				Small rock pile 8.0m.x30'x1.5m. uncorrected height above seafloor; Coincident with Line 17 rock scattered throughtout line; hard bottom or outcrop; Possibly coincident with LB 18 (judged by Hunter and James, 1989 as insignificant)	Insignifican
17	17	125	98.5	40	P				Small single rock 5 m. diameter x 5m. uncorrected height above seafloor	
18	5	100	57.5	5	P	Pending	N/A	N/A	30-40'x19.7x 1m. two parallel linear features coincident with rock pile and	Insignifican cultural

									cabling area.	feature
18	6	100	58.5	30	S	Pending	N/A	N/A	Same feature	
18	17	125	0.2	26	S	Pending	N/A	N/A	Small rock, 1 m. diameter x 1.0 m. uncorrected height above seafloor	
18	4	2.5		N/A	N/A	Pending	4 gammas	100 ft.	Unknown ferromagnetic source	
19	17	125	01.7	20	S	Pending	N/A	N/A	Unknown (possible 55 galleon drum) or tire 2.5 m. diameter	Insignificant cultural feature
19	3	4.0		N/A	N/A	Pending	5 gammas	100 ft.	Unknown ferromagnetic source. Coincident with cabling area.	Insignificant cultural feature
20	17	125	01.6	35-45	P	Pending	N/A	N/A	Two parallel linear features 50' x 1m.x1 m. and 30' x 1m. x 1m. uncorrected height above seafloor; coincident with cabling area.	Insignificant cultural feature
20	2	100	17.0	N/A	N/A	Pending	7 gammas	100 ft.	Unknown Ferromagnetic source	
20	1	100	4.5	N/A	N/A	Pending	4 gammas	100 ft.	Unknown Ferromagnetic source	
21	6	100	5	N/A	N/A	Pending	4 gammas	100 ft.	Unknown Ferromagnetic source	Unknown
22	6	125	9.5	N/A	N/A	Pending	6.5 gammas	100 ft.	Unknown ferromagnetic source	Unknown
23	9	100	9.5	N/A	N/A	Pending	6 gammas	100 ft.	Unknown ferromagnetic source coincident with rock pile	Unknown

447

24	18	125	5.8			Pending	N/A	N/A	1 m. square lobster trap	Insignificant cultural feature
24	18	125	5.7	N/A	N/A	Pending	10 gammas	100 ft.	83 ft. scour and 75 ft. elliptical object with 2 large 8ft. square areas with interior shadows. Ellipse has 13 ft. uncorrect seafloor height; 9-10 ft. width 75.46 length. Possible small boat.	Potentially significant cultural feature
25	18	125	8.2	30	S	Pending	N/A	N/A	90 ft. diameter rock pile	Insignifican
26	18	125	6.5	35	P	Pending	N/A	N/A	2 rock like objects 12 ft. long x 2m.with 2m. uncorrected seafloor height	Insignifican
27	4	100	14.0	N/A	N/A	Pending	5 gammas	100 ft.	Midchannel; probably associated with Buoy	Insignifican
28	6	100	21.0	N/A	N/A	Pending	4 gammas	100 ft.	Unknown ferromagnetic source	Insignifican
29	5	125	23.5	N/A	N/A	Pending	Possible 30 gammas	100 ft.	Coincident with rock pile seen on line 1	Insignifican
30	2	100'	44.0	N/A	N/A	Pending	7 gammas	100 ft.	Unknown ferromagnetic source	Insignifican
31	2	100'	45.0	N/A	N/A	Pending	30 gammas	100 ft.	Unknown ferromagnetic source	Insignifican

448

Appendix G

DETERMINATION OF CONSISTENCY

I INTRODUCTION

This report has been prepared by the U.S. Army Corps of Engineers, Los Angeles District (LAD) in support of the proposed deepening and modifications of the main approach channel to the Port of Long Beach from the Queen's Gate entrance to about 76-foot mean lower low water (MLLW) contour. The proposed project area is located in the City of Long Beach, Los Angeles County, California, as identified on Figure 1-1 in the attached EIS/R.

As a Federal agency, LAD is responsible for ensuring project compliance with the Federal Coastal Zone Management Act of 1972 (CZMA). Section 307 of the Act [Title 16, U.S. Code Section 1456(c)] states that Federal Actions must be consistent with approved state coastal management programs to the maximum extent practicable. The California Coastal Act is this state's approved coastal management program applicable to the Proposed Project. To document the degree of consistency with the state program, the Act requires the preparation of a Consistency Determination (CD) whenever a project could directly effect the coastal zone. This CD provides a description of the Proposed Project, identifies each relevant policy of the California Coastal Act, discusses the proposed project's consistency with each of those policies, and where applicable, describes measures, which when implemented, will result in project consistency with state policies to the maximum extent practicable.

The LAD and the Port of Long Beach (POLB) have completed a Draft Environmental Impact Statement/Report (EIS/R) which: 1) identifies and discusses the problems and needs related to this action, 2) evaluates alternatives, and 3) addresses the impacts of the proposed project and alternatives as part of the decision process. The determination of consistency with the California Coastal Act is based on the analysis performed for both this CD and the attached EIS/R. The EIS/R was prepared in compliance with the Council on Environmental Quality (CEQ) Regulations (40 C.F.R. 1500-1508) and the procedural provisions of Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321, as amended. The NEPA was used as a measure for assessing the magnitude of project impacts.

II CALIFORNIA COASTAL ACT

California's coastal management program was implemented by the California Coastal Act of 1976, and has been amended numerous times. The following portions of the Act provide relevant policy guidance of the CD:

- Declarations (Section 30007.5)
- Ports (Sections 30702-30708)
- Public Access (Sections 30210-30214)
- Recreation (Sections 30220-30224)
- Marine Environment (Sections 30230-30237)
- Land Resources (Sections 30240-30244)
- Development (Sections 30250-30255)

III PLANNING OBJECTIVES

Based on the analysis of the identified problems, needs, and opportunities and the existing physical, human, and environmental conditions of the study area; the following planning objectives were identified to direct the formulation and evaluation of alternative plans:

1. Efficient Fleet. Optimize the efficiency of transporting existing and future waterborne commerce through the POLB by accommodating a more efficient crude oil tanker fleet.

2. Environmental. Preserve and improve environmental resources to the maximum extent practical.

Objective 1 is fundamental to improving the efficiencies of existing and future operations with respect to transportation costs, loading and unloading, and other costs associated with the movement of waterborne commerce. These objectives are consistent with federal planning guidelines and the primary goal of contributing to the Nation's economic development consistent with applicable environmental laws, regulations, and policy.

Objective 2 includes the specific objectives of alleviating existing and future air quality and traffic congestion impacts resulting from inefficient cargo handling operations. This objective is related to Federal, State, and local environmental statutes, regulations, and policies, and is characterized by the following four environmental goals: (1) avoid any unacceptable adverse impact on environmental resources, (2) where impacts are not avoidable, they should be minimized to the greatest possible extent, (3) any remaining unavoidable impacts must be mitigated to insignificance if possible, and (4) improve or restore environmental quality wherever possible without adding undue cost or compromising the primary objectives.

IV FEDERAL PROJECT OBJECTIVE

The primary planning objective identified to direct formulation and evaluation of alternative plans based on the analysis of the identified problems, needs, and opportunities and the existing physical, human, and environmental conditions of the study area is to preserve and improve environmental resources to the maximum extent practicable.

This objective concerns compliance with Federal, State, and local environmental statues, regulations, laws, and policies, and is characterized by the following four environmental goals:

1. Avoid any unacceptable adverse impact on environmental resources;

2. Where impacts are not avoidable, they should be minimized to the greatest possible extent;

3. Any remaining unavoidable impact must be mitigated to a level that is not significant; and

4. Improve or restore environmental quality wherever possible without adding undue cost or compromising the primary objectives.

V FEDERAL CONSIDERATIONS

The criteria set forth below represent how different plans are evaluated under federal guidelines. They also provide the guidelines for screening the potential alternatives to determine a recommended plan. The four main evaluation criteria used in LAD plan formulation are effectiveness, efficiency, completeness, and public acceptability.

1. Effectiveness - the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.

2. Efficiency - the extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.

3. Completeness - the extent to which an alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects.

4. Acceptability - the workability and viability of the alternative plans with respect to acceptance by state and local entities and the public, and compatibility with existing laws, regulations, and public policies.

VI PORT OF LONG BEACH CONSIDERATIONS

The planning considerations set forth below were used to evaluate the proposed project in accordance with local guidelines:

1. Tenant Efficiency. Allow POLB tenants to utilize more efficient, deeper draft tankers. Use of these cost-effective, deeper draft vessels would result in POLB tenants being more competitive.

2. Tenant Safety. Improve safety when bringing ships into the POLB by reducing the number of tanker trips as well as improving the entrance channel clearances, thereby reducing the likelihood of collisions and spills.

3. Environmental. Preserve and improve environmental resources within San Pedro Bay to the maximum extent possible with the reduction of air pollutants by reducing emissions per ton of cargo.

VII STUDY AUTHORITY

Federal authorization and involvement in providing navigation features and improvements for Long Beach Harbor dates from 1856. Congress has authorized federal participation in the study of improvements in response to specific requests. The primary concern has been to ensure that harbor facilities are adequate to efficiently meet present and future cargo handling and distribution needs. The following is a summary of recent Congressional authorizations:

- Water Resources Development Act of 1986 (P.L. 99-662, Title II, Harbor Development, Section 201(b) and Section 905);

- Water Resources Development Act of 1988 (P.L. 100-676, Section 4, Project Modifications); and

- Water Resources Development Act of 1990 (P.L. 101-640, Section 102, Project Modifications).

VIII SUMMARY OF PROPOSED ACTION

A. PROJECT DESCRIPTION

The LAD and the POLB propose to deepen and modify the main approach channel to the Port beginning at the Queen's Gate entrance out to approximately the 76-foot MLLW contour. The proposed project area is located in the City of Long Beach, Los Angeles County, California.

B. PROJECT CONSTRUCTION

The proposed project (recommended plan) consists of dredging approximately 5.6 million cubic yards (mcy) of material at the main approach channel and placing material in the Port of Los Angeles (POLA) Pier 400 footprint, the Main Channel Pit, and the Southeast Energy Island Pit. The POLA would accomodate 2.0 mcy; the Main Channel Pit, 2.1 mcy; and the Energy Island pit, 1.5 mcy (see Table 3-3 in the attached EIS/R).

It is assumed that a hopper dredge would be used for dredging and placing activities. The dredge picks up material by pulling a suction drag head along the bottom. The excavated material is stored on-board in a compartment, i.e. the vessel hopper. Once full, the dredge travels to and then discharges its load at the placement site, by bottom dumping. (For the POLA option, the sediment would then be transported by electric hydraulic dredge into the Pier 400 landfill area.) The support equipment for a trailing suction hopper dredge includes a 50-foot crew boat, 25-foot survey boat, and buoys marking work areas.

Construction is planned to start in 1997. Dredge activities and placement would occur 24 hours per day. Construction is estimated to last between 16 and 22 months. Chapter 3 in the attached EIS/R presents a more detailed project description.

C. ANCILLARY FACILITIES

1. *Crude Oil Storage Tanks*

The proposed project would require some landside development. Following construction, larger vessels will be able to more efficiently use the port by bringing in larger quantities of crude, which will require an additional onsite storage capacity for about 1.05 million barrels. Thus, additional facilities consisting of two to three tanks and the associated piping will be installed and connected to existing ARCO storage facilities. Construction of the storage tanks would occur in an existing parking lot located in the City of Carson and adjacent to the City of Los Angeles (Figure 3-3 in the attached EIS/R). Site development would use about 8.5 acres of land.

An existing crude oil pipeline would be used to transport the oil from Berth T121 to the tanks. Although it would take longer to offload each ship, the additional facilities are not expected to change current offloading procedures. Following construction, there would be no change in operational emissions per ton of cargo offloaded at Berth T121 compared to current levels.

The additional tanks are not part of the federal project and are only generally analyzed in the attached EIS/R. The applicant, ARCO, will prepare additional environmental documentation to fully assess impacts.

2. *Staging Area*

The project will require use of a 2-acre temporary staging and storage site to support dredging activities. The proposed location is the eastern end of the Naval Base Mole (Figure 3-3), a paved site currently vacant. The Naval Mole area has been previously used as a storage facility, an intermediate maintenance area, a ship supply facility, a communications center, and a recreation area. This federally owned land is under control of the U.S. Navy.

D. PURPOSE AND NEED

The proposed navigation improvements at the POLB are needed to increase the efficiency of existing operations by allowing larger crude carriers to call fully loaded to Berth T121, thereby improving cargo movement efficiencies and reducing transportation costs.

Table 3-4 in the attached EIS/R summarizes the annual number of visits by ship size to Berth T121 under both the no-action alternative and the proposed-project. Due to a projected shift of trade routes to the Far East and Persian Gulf, and economies of scale, the fleets will trend toward deeper draft vessels. Under the no-action alternative, this will result in nearly all crude tankers having to light load while entering the port in the future.

Table 3-4 shows that for every projected future year (2000 to 2040), the total annual number of vessel trips to Berth T121 would be higher under the no-action alternative than for the with-project condition. Over the 40-year projection period, total annual vessel trips to Berth T121 are projected to decline 21 percent under the no-action alternative and 44 percent under the with-project condition.

E. SUMMARY OF ALTERNATIVES

The following preliminary alternatives were considered: monobuoys, lightering, and/or port modifications. As discussed in Section 3.2 of the attached EIS/R, monobuoys and lightering are not viable alternatives for meeting project objectives.

Deepening the Queen's Gate main channel would involve dredging the approach channel to the POLB and placing the dredged material at one or more of the sites described below. The dredge area and all potential placement sites are shown in Figure 3-1 in the attached EIS/R.

Deepening Queen's Gate Main Navigation Channel

Depth Configurations

Depths between -63 and -78 feet MLLW were analyzed to determine those most feasible for allowing vessel traffic to enter the channel fully loaded. The optimized channel depth is -76 feet MLLW, which would require about 5.6 mcy of material to be removed.

Criteria for Selecting Material Placement Sites

Criteria for selecting suitable sites for dredged material placement include engineering feasibility and economic considerations; federal and local support and acceptability; sediment suitability for a given site; and environmental considerations.

Material Placement Options

Material placement options for dredged sediment include:

1. Landfill in the POLA Pier 400 Project;
2. Placement in borrow pits, including Main Channel, Energy Island North and Southeast, and Los Angeles River Mouth;
3. Offshore placement at LA-2;
4. Nearshore placement, including Peninsula Beach, Seal Beach, and Surfside-Sunset beaches;
5. Onshore placement, including Peninsula Beach, Seal Beach, and Surfside-Sunset beaches; and
6. Landfill at upland sites.

Pertinent characteristics of each of the potential placement sites, including capacities, are shown in Table 3-1 of the attached EIS/R.

Summary of Alternatives for Further Study

Chapter 3 in the attached EIS/R presents the alternative analysis and Table 3-2 provides a preliminary comparison of potential placement options. Chapters 4 and 5 analyze viable alternatives, including POLA Pier 400, Borrow Pits, LA-2, and No Action options. Chapter 6 presents the Environmentally Preferred Alternative, the National Economic Development Plan, and the LAD/POLB Recommended Plan. The recommended plan is presented in Section VIII.B.

COASTAL POLICIES AND POTENTIAL EFFECTS

All Federally conducted or supported activities directly affecting the coastal zone are to be undertaken in a manner consistent to the maximum extent practicable with approved state coastal management programs. Under Section 930.32 of 15 CFR, Chapter IX, the term "consistent to the maximum extent practicable" describes the requirement for Federal activities to be fully consistent with state coastal management programs unless compliance is prohibited by other laws applicable to the Federal agency's operations.

In the sections that follow, each relevant policy from the California Coastal Act is provided (in italics). Following each policy is a brief discussion demonstrating project consistency with each element of the policy to the maximum extent practicable.

I DECLARATIONS

Section 30007.5:

The Legislature further finds and recognizes that conflicts may occur between one or more policies of the division. The Legislature therefore declares that in carrying out the provisions of this division such conflicts resolved in a manner which on balance is most protective of significant coastal resources. In this context, the Legislature declares that broader policies which, for example, serve to concentrate development in close proximity to urban and employment centers may be more protective, overall, than specific wildlife habitat and other similar resource policies.

II PORTS

Section 30701:

Existing ports shall be encouraged to modernize and construct necessary facilities within their boundaries . . . to minimize the necessity of creating new ports elsewhere in California.

The project's purpose is to allow large crude-oil tankers to enter the port in the most efficient manner and offload safely in the least environmentally damaging way and at the least cost. In otherwords, this project would modernize the approach channel and improve movement of cargo in and out of the Port. The project would improve vessel access to primary port facilities, and thus reduce the need for new ports in new areas of the state.

Section 30703:

The California commercial fishing industry is important to the State of California; therefore, ports shall not eliminate or reduce existing commercial fishing harbor space, unless the demand for commercial fishing facilities no longer exists or adequate alternative space has been provided. Proposed recreational boating facilities within port areas shall, to the extent it is feasible to do so, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

The proposed project will not eliminate or reduce existing commercial fishing space within the harbor. Commercial/recreation impacts are not expected to be significant. Additional information is provided on commercial fishing impacts in Policy Section 30234.

Section 30705

(a) *Water areas may be diked, filled, or dredged when consistent with a certified port master plan,* and only under certain conditions. One condition is:

> *(1) Such construction, deepening, widening, lengthening, or maintenance of ship channel approaches, ship channels, turning basins, berthing areas, and facilities as are required for the safety and the accommodation of commerce and vessels to be served by port facilities; (2) New or expanded facilities or waterfront land for port-related facilities; ...*

The proposed channel would be consistent with the Port Master Plan for the POLB (see section 4.8 in the attached EIS/R).

Dredge and fill activities would be undertaken to accommodate commerce and vessels served by port and ancillary facilities. Presently, the main approach channel is not deep enough to handle fully-loaded, deep-draft tankers. This means that either smaller vessels are used, or tankers must come to port only partially loaded with the use of tides. The use of deeper draft vessels would be more efficient due to the established economies of scale (see section 2.2 of the attached EIS/R). Similarly, with increased vessel size, fewer ships would be required to carry projected loads (see Section 3 of the EIS/R); thus, allowing ships to more efficiently utilize limited dock facilities and significantly reducing potential safety hazards associated with ship queuing in the harbor while waiting for dock space. In addition, the creation of the deeper channel would minimize hazards of larger vessel movements to and from the more congested areas of the inner harbor.

(b) The design and location of new or expanded facilities shall, to the extent practicable, take advantage of existing water depths, water circulation, siltation patterns, and means available to reduce controllable sedimentation so as to diminish the need for future dredging.

Due to existing oceanic conditions (Section 4.1/4.2 of the attached EIS/R), periodic maintenance dredging of the channel is not anticipated.

(c) Dredging shall be planned, scheduled, and carried out to minimize disruption to fish and bird breeding and migrations, marine habitats, and water circulation. Bottom sediments or sediment elutriate shall be analyzed for toxicants prior to dredging or mining, and where water quality standards are met, dredge spoils may be deposited in open coastal water sites designed to minimize potential adverse impacts on marine organisms . . . [section 30705(c)].

As noted under Coastal Act section 30233(b), dredging is to be conducted in a manner that minimizes disruption to marine habitats and water circulation, with no impacts on fish and bird breeding/migrations. In preparation of this project, bottom sediments have been analyzed for toxicants (Sea Surveyor, Inc. 1994), and it has been determined that water quality standards will be met. Material placement has been designed to minimize impacts to federally listed species.

Project timing could affect the seasonal activity of sensitive biological species, such as the California least tern and California brown pelican. Both species could be present near dredge and/or borrow pit placement areas. Least terns nest from approximately April through August and, although unlikely, could forage over some of the borrow pits during April and May. Brown pelicans often rest on the breakwaters adjacent to Queen's Gate. They are most abundant from early July to early November. The only potential impact of dredging to pelicans would be disturbance of resting on the breakwater at Queen's Gate. Since these birds can easily rest elsewhere along the breakwater, rescheduling dredging is not warranted. The sensitive biological period is April and May, the beginning of the least tern nesting period.

If material is placed only at sites in San Pedro Bay, construction could be completed within 18 months. If construction proceeds uninterrupted during this period, the environmentally preferred alternative would entail beginning construction as early as June (when least terns would not be foraging in the borrow pit areas) or as late as late August of the first year (1997), continuing through the entire second year (1998), and completing construction in January or March of the third year (1999). Only one least tern nesting season would occur during this construction period. During this nesting season, the top sediments would be placed at the POLA Pier 400 site, and then the bottom at the Main Channel borrow pit, or in the deepest portions of the Energy Island borrow pits.

It may not be possible to begin construction under the optimal timing scenario described above. In such an event, it would still be possible to minimize potential impacts on least tern foraging. The strategy would then entail avoiding use of the Energy Island pits during the least tern season and returning to these pits during a time when least terns are not nesting.

Section 30706:

In addition to the other provisions of this chapter, the policies contained in this section shall govern filling seaward of the mean high tide line within the jurisdiction of ports:

(a) The water area to be filled shall be the minimum necessary to achieve the purpose of the fill.

Channel dimensions have been optimized to provide adequate width for vessels while minimizing environmental and cost factors by accommodating large, deep-draft vessel needs. Section 3 of the attached EIS/R provides additional information on optimizing required dredge volumes.

Section 6 presents the recommended plan which is the environmentally preferred plan. With agency coordination, this plan minimizes the required mixing zone to the smallest practicable zones for disposal.

(b) The nature, location, and extent of any fill, including the disposal of dredge spoils within an area designated for fill, shall minimize harmful effects to coastal resources, such as water quality, fish or wildlife resources, recreational resources, or sand transport systems, and shall minimize reductions of the volume, surface area, or circulation of water.

Measures to minimize harmful effects of dredge and fill activities on coastal resources (such as water quality, fish or wildlife resources, recreational resources, or sand transport systems), have been incorporated into the recommended plan and fully described throughout this document and in the attached EIS/R. The proposed channel has been designed to minimize required dredging volumes, fill creation, and associated effects on coastal resources.

As identified, the Proposed Project will optimize existing and future port facilities, and thereby, minimize the reduction of volume, surface area, and circulation of water within the port complex. Modeling indicates there will be no significant reduction in water quality or circulation within the harbor.

(c) The fill is constructed in accordance with sound safety standards which will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters.

The proposed project will be conducted under established sound safety practices to protect against unstable geologic or soil conditions. Detailed discussion of measures to protect against the hazard of high geologic activity is provided in the geology attachment to the Feasibility Study.

(d) The fill is consistent with navigation safety.

The project will be conducted in accordance with established navigation safety requirements and will not pose significant navigation hazards when completed. Channels have been designed to meet projected fleet needs, and ensure safe and acceptable maneuvering lanes. Detailed discussion is provided in the Feasibility Study.

Section 30707:

New or expanded tanker terminals shall be designed and constructed to do all of the following: (a) Minimize the total volume of oil spilled; (b) Minimize the risk of collision from movement of other vessels; (c) Have ready access to the most effective feasible oilspill containment and recovery equipment; and (d) Have onshore deballasting facilities to receive any fouled ballast water from tankers where operationally or legally required.

Not applicable. The potential for spills and collisions is discussed in Policy Sections 30232.

Section 30708:

All port-related developments shall be located, designed, and constructed so as to:

(a) Minimize substantial adverse environmental impacts.

Section 4 of the attached EIS/R includes a detailed analyses of project resource impacts. Section 6 presents the recommended plan and the least environmentally damaging alternative. Section 1 outlines mitigation measures to minimize substantial adverse environmental impacts associated with the least environmentally damaging alternative (recommended plan).

(b) Minimize potential traffic conflicts between vessels.

Deepening the Queen's Gate main entrance channel would meet the project objective to allow large crude-oil tankers to offload safely and efficiently in the least environmentally damaging manner and at the least cost. This project would result in fewer supertankers utilizing the channel entrance and minimize potential vessel traffic conflicts as compared to current conditions.

(c) Give highest priority to the use of existing land space within harbors for port purposes, including, but not limited to navigation facilities, shipping industries, and necessary support and access facilities.

The proposed project provides highest priority to existing land and water uses within the harbor for port purposes. The POLB has a great diversity of port related land and water uses. The Proposed Project will enhance these uses because existing piers will more efficiently accommodate fewer projected vessels.

(d) Provide for other beneficial uses consistent with the public trust, including, but not limited to, recreation and wildlife habitat uses, to the extent feasible.

Recreation uses are presented in Section IV; wildlife habitat benefits, in Section V.

(e) Encourage rail service to port areas and multicompany use of facilities.

This policy is not applicable to the Proposed Project.

III PUBLIC ACCESS

Section 30210:

In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse. (Amended by Ch. 1075, Stats. 1978.)

Due to safety concerns, public access may be limited within the immediate project construction area.

Project construction would occur over 16- to 22-month period. The hopper dredge could make seven to eight trips per day from the dredge to placement sites. This would not represent a substantial increase, given the number of vessels typically active in the harbor.

Dredging is not expected to require the closure of any navigation channels. The contractor would participate in an orientation session of port harbor operating procedures prior to construction. Due to the limited duration of this activity and Port-required coordination with the Long Beach Pilot Station, construction impacts on vessel transportation are expected to be minimal.

Projections for the year 2010 indicate the proposed project would eliminate 22 annual tanker trips to Berth T121. This would decrease the existing (1994) annual average 80 trips to 58 trips. Increased vessel size would not increase potential for transportation incidents; while reduced traffic have a beneficial impact on vessel safety. No navigational problems are anticipated as a result of the decreased vessel activity.

Proposed project will not cause a significant adverse impact upon public access to harbors, local beaches, or associated recreational facilities; nor restrict existing public access to coastal resources.

Section 30211:

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

As noted, the project may temporarily and minimally interfere with the public's right of access to the Pacific Ocean while the Queens Gate entrance channel is being dredged.

Section 30212:

(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources,

If needed, public access will be restricted only near construction equipment and work areas for safety purposes.

(2) adequate access exists nearby, or,

Alternative and adequate access exists nearby the proposed project area, which is not expected to be affected.

(3) agriculture would be adversely affected. Dedicated access way shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.

Not applicable.

IV RECREATION

Section 30220:

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

The proposed project is consistent with the stated policy since it concentrates on needed port development, accommodates expansion within existing port boundaries (Coastal Act 30701[b]), and avoids need to create new ports in other areas suited for water-orientated recreational activities.

Furthermore, ship traffic associated with cargo transport will decrease over time as well as future levels projected under the no action. Fewer vessel trips into the port will increase public enjoyment and recreational boating opportunities.

Section 30224:

Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, ... by limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, ...

Ancillary facilities will be developed on upland areas. Cargo transport efficiencies will improve and require fewer vessel trips into the port, which will increase public enjoyment/use of recreational boating opportunities.

V MARINE ENVIRONMENT

Section 30230:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

The affected habitat consists primarily of marine waters including soft bottom. (An inventory of the existing marine resources is provided in Section 4.3.1 of the EIS/R; following is a summary of the anticipated marine resource impacts.)

CONSTRUCTION IMPACTS

The Dredge Area

Deepening the approach channel to Queen's Gate to a depth of 76 feet below MLLW will disturb 385.7 acres of deep soft bottom habitat. The entire area will not be disturbed at one time; but rather, progressively over 16 to 22 months. The loss of invertebrates will be short term with recolonization in 2 to 3 years. The species composition following recolonization will differ somewhat from that currently present due to potential changes in sediment characteristics and depth.

Turbidity created by dredging will likely range between 1,000 to 4,000 feet and may extend further depending on localized conditions. Deposition from the suspended sediment plume will occur over the area, but most will occur within about 50 to 100 feet of the dredge with negligible amounts beyond 500 feet (unpublished data from POLA). Some benthic organisms within 100 feet of the dredge will be impacted by sedimentation; impacts on benthic communities will be short term and not significant.

Sediment testing results indicate concentrations of metals and organic chemicals in dredge sediments are lower than those at placement sites. The potential for release of metals and organic chemicals from sediments resuspended during dredging will be negligible. Consequently, direct toxic effects to marine organisms or bioaccumulation through the food web will be negligible.

Turbidity may have short-term effects on plankton in the immediate vicinity of the dredging operation. No significant impacts will occur due to the relatively small area affected by the turbidity plume and the rapid recovery of these populations.

Although fish populations in the area may be affected, most species will avoid the dredging area due to noise and turbidity. Impacts will be restricted to a small area around the dredge and will not be significant. The area will recolonize the area shortly after dredging stops and turbidity dissipates.

Daytime dredging activities will lead most seabirds to avoid the immediate disturbance area while scavenger species such as gulls may be attracted to the site. Activities close to the Queen's Gate may disturb birds resting or roosting on the breakwaters. Some individuals may move farther down the breakwater while others leave the area until the dredging is complete. Effects will diminish as dredging moves offshore.

Of particular concern is the potential effects on the California brown pelican that rests on the breakwaters and forages throughout the general area. Dredging activities and the resulting turbidity plume will likely preclude pelican foraging in a small area. Fish that brown pelicans forage on are expected to move away from the site and be available for capture elsewhere. The number of individuals affected will be lowest from December through June, when few pelicans are present. Nesting activities will not be affected, and only a very small fraction of the available foraging area will be temporarily affected. Dredging adjacent to the breakwater will cause some brown pelicans to temporarily avoid resting or roosting near Queen's Gate. These individuals can use portions of the breakwater away from this activity. The remainder of the dredge area is farther away, dredging will have no affect on resting or roosting. Overall, dredging activities would not affect the brown pelican nor jeopardize their continued existence.

The California least tern is present in the harbor area from April through August. As discussed for the pelican, prey fish are expected to move away from turbid waters, but will still be available for tern predation. Turbidity will not affect the terns ability to find food. Dredging activities near Queen's Gate will not affect the least tern population nor jeopardize their continued existence.

Marine mammals present in the project area will also likely avoid turbid areas. There are no important feeding or resting areas that will be affected by the project. Sea turtles passing through the area will also likely avoid disturbance areas.

During night dredge operations, high intensity flood lights will be used to direct light onto dredge deck and immediate vicinity. The light will not significantly effect benthic invertebrates, plankton, fishes, and marine mammals. Roosting birds on the breakwater at night may avoid the area influenced by the light while dredging occurs in immediate area. The amount of roosting habitat affected will be small and will decrease as the dredge moves offshore.

Although commercial trap fishing occurs along the breakwaters, it is likely that target species (i.e. lobster, crab, and fish) will move away from the impact area and will be available for catch elsewhere.

Placement Options

Landfill in the Port of Los Angeles

Transport of dredged material into the POLA for placement in the Pier 400 landfill will have negligible impacts on marine biological resources. Mitigation measures developed for DDNI EIS/EIR (COE and LAHD 1992) will be POLA's responsibility for implementation.

Borrow Pits

Main Channel Borrow Pit

Placement of the dredged material in this borrow pit will bury benthic invertebrates. Recolonization is expected within 2 to 3 years. Impacts on benthic infaunal communities will be short term and not significant.

Turbidity resulting from placement will have negligible impacts on plankton as described for the dredge site. Most fish will temporarily avoid discharge area due to turbidity. Fish may return to the area between loads of fill. No important spawning grounds or foraging areas will be affected. Fish impacts will be short term and not significant. Recovery to preproject conditions is expected following dispersal of turbidity plumes.

Night lighting on the dredge will have negligible impacts on fish, plankton, and seabirds as described for the dredge site.

Placement of sediments into the pit, including dredge transport, will have no adverse effects on seabirds since few are expected in the pit area due to frequent vessel traffic. The borrow pit is located within 3 miles of the Terminal Island least tern nesting colony, but the depth of water at the placement site makes it unlikely that terns forage in that area. Furthermore, fish avoiding disturbance areas will be available for capture elsewhere. Therefore, no effect is expected to occur on the least tern population. No effect on the California brown pelican population is expected for reasons discussed above. The continued existence of these species will not be jeapordized.

Impacts on marine mammals, sea turtles, and commercial fishing are predicted to be negligible.

Energy Island Borrow Pits

The sediments placed in the pits will bury benthic invertebrates. Recolonization will occur within 2 to 3 years. Increasing the grain size and decreasing the depth with sediments that are generally cleaner will provide conditions suitable for species similar to adjacent areas. This will be an improvement in the local ecology by restoring the topography to shallower habitat that is generally more productive than deeper habitats.

Turbidity will have negligible impacts on plankton as described for the dredge site.

As described for the dredge area, most fish will temporarily avoid the discharge area. Since the frequency of discharge will be approximately once every 3 hours, fish may return to the area between discharge events. Night lighting on the dredge will intermittently affect a small area and will have negligible effects on fish. Fish populations in the disposal pit area after the project is complete are expected to be about the same as those currently found in adjacent areas where water depths are approximately 30 feet. The species of fish expected are all common in the area. Impacts on fish populations will be short term and not significant.

Seabirds using the discharge area will be temporarily disturbed every time a barge arrived and released sediments. As described in section 4.2 of the attached EIS/R, the turbidity plume will be greatest closer to the bottom, and the weak currents in the area are unlikely to disperse it over a very large area. A relatively small amount of potential foraging area will be affected. Night lighting on the dredge will intermittently affect a small area of the discharge site. These disturbances will not affect any sensitive species, such as the brown pelican or least tern, since few if any individuals will be expected in the area. Least terns are only present in the harbor area from about mid April through August and most foraging is within 3 miles of the nest site. The borrow pits are over 4 miles from both tern colonies and, since the plume will sink over time, any turbidity impacts to the upper waters where terns forage will be very short-term. The pelicans forage widely throughout the area, and their abundance is low during winter and spring. Neither species forages at night. Any impacts will not affect the local populations of either species. Birds could use the water surface in the intervals between discharges. Impacts will be short term, over a small area, and not significant for any species.

Placement of sediments into the pits will have negligible impacts on marine mammals and sea turtles. Few, if any, individuals are expected to be present at this location, and those passing through the area, such as sea lions or dolphins, can easily avoid the disturbance.

The only commercial fishing that may occur in the borrow pit area is some live bait fishing. Discharge of sediments into the pits can interfere with commercial fishing in the pit area for the duration of the project. The amount of fishing grounds affected will be negligible.

LA-2

Discharge of dredged sediments at the LA-2 site will bury some benthic organisms. The amount of benthos affected will depend on whether the individual discharges occurred at the same location or were spread out over the entire site. Benthic organism densities are generally higher than those found in the area to be dredged. Impacts will be short term and insignificant since effects will be either diffuse over the site or concentrated in a small area.

Turbidity will have negligible impacts on plankton as described for the dredge area.

Disturbance of fish populations in the water column and on the bottom in the immediate disposal area will occur about every 4.5 hours over approximately 22 months. The amount of area affected with each dredge load of sediment will be minimal.

Seabirds in the LA-2 area and along the route from Queen's Gate to LA-2 will be temporarily disturbed as each dredge arrives. This traffic will be no different than other vessel traffic in the area and have negligible effects on birds. No brown pelicans or least terns will be affected by the transport and discharge of sediments at the LA-2 site.

Dredge traffic to and from the site and discharge of sediments will have no adverse effects on marine mammals and sea turtles.

Commercial fishing impacts will also be negligible.

LONG-TERM IMPACTS

Filling the Energy Island borrow pit to a depth of 30 feet below MLLW will have long-term beneficial impacts on benthic infauna and potentially for fish that rest on the bottom and/or forage on infaunal organisms. Cleaner (less polluted) sediments and shallower water are expected to result in a greater diversity of benthic infaunal organisms in the area filled once recolonization has occurred. These organisms will provide a wider range of prey items for fish and will decrease potential for bioaccumulation of pollutants in the food web.

Section 30231:

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

A discussion of the relationship of the project to biological productivity and quality of coastal waters was addressed in Section 30230 and in Section 4.3 of the attached EIS/R. The overall effect of the proposed activities is not considered significant. It is anticipated that disturbed habitat (i.e. soft bottom) areas would recolonize within two to three years.

This project will not significantly impact biological productivity or quality of coastal waters, streams, wetlands, estuaries, and lakes.

This project will not generate additional loads of wastewater, require freshwater supply that would deplete groundwater supplies, or affect surface water flow.

In the event that it is interpreted that the Proposed Project will result in a reduction of productivity and quality of coastal waters in the harbor, there exists a policy conflict between maintaining the biological productivity of coastal waters (section 30231) and development of an existing port complex for regional and national benefits (section 30701).

In such cases, the Legislature, as identified in section 30007.5, has found that "broader policies, which for example, serve to concentrate development in close proximity to urban and employment centers might be more protective overall, than specific wildlife habitat and other similar resource policies". Therefore, in citing section 30007.5, the broader policy of concentrating development within an existing port in order to minimize or eliminate the necessity to create new ports in new areas of the state, which the Proposed Project accomplishes, overrides the specific policy of protecting coastal areas suited for water-orientated recreational activities.

Section 30232:

Protection against the spillage of crude oil, gas, petroleum products, of hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

The Proposed Project will result with a reduction of port-related ship traffic associated with cargo transport over time as compared to current levels and future levels projected under the no action. Fewer vessel trips will increase overall safety and further reduce potential against spillage of crude oil, gas, petroleum products, or other hazardous materials.

Vessel and safety impacts may occur since dredging and disposal activities will require use of some heavy equipment, primarily tug boats, barges, dredges, and support vehicles. Construction will not impede access to any channels or entrance ways. To further minimize safety concerns, work crews will only be permitted access to project areas and equipment and project areas would be appropriately marked and notifications posted.

The potential also exists for equipment to leak fuel due to a mechanical or structural failure, or from grounding. The potential for a mechanical or structure failure is similar to that of other vessels, which is typically extremely low. Likewise, the potential for a grounding is also low because the vessel operator would be familiar with the area and not operate under extreme weather conditions. Since the overall probability of a leak is unlikely and the amount of fuel that might be leaked is minor, potential impacts would be classified as insignificant.

Section 30233:

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following: (1) New or expanded port (harbor), energy, and coastal-dependent industrial facilities, including commercial fishing facilities... (b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems...

This project does not involve any diking activities.

Dredging is the only feasible way to provide efficient access to existing terminals by large, deep draft vessels. As discussed, the recommended plan is the least environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects. A brief discussion of alternatives has been presented above. A detailed alternative analysis and impact analysis is presented in section 3 and 4 of the attached EIS/R, respectively.

Construction will be conducted to avoid significant disruption to marine and wildlife habitats (see section 4.3 of the attached EIS/R) and water circulation (see section 4.2 of the attached EIS/R). Turbidity impacts will be short-term, while bottom topography changes will be permanent. General circulation and flushing will not be significantly affected. (A discussion of environmentally sensitive habitat areas was addressed under Section 30230 and in Sections 4.2 and 4.3 of the attached EIS/R.)

Section 30234:

Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, *be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.*

Commercial fishing within the Los Angeles-Long Beach Harbor is limited to a live bait fishery, while a variety of commercial fisheries occur outside the harbor (COE and LAHD 1990). The live bait fishery targets northern anchovy and squid. The live bait fishery within the harbor consists of one local fisherman. The primary target species is California halibut, although other species are fished at some times of the year. Crab and lobster are also fished for using traps. Crab season is open all year while lobster season extends from early October to mid-March. Traps are set near the harbor breakwaters as well as at other locations along the coast.

Commercial trap fishing along the breakwaters may affect a small area while construction is in the area, however, this impact will not be significant. Lobster, crab, and fish that move away from the dredging will be available for catch elsewhere.

The only commercial fishing that may occur in the borrow pit areas is some live bait fishing. Discharge of sediments into the pits may interfere with commercial fishing in the pit area for the duration of the project. The amount of fishing grounds affected will be small relative to that present in the area, and impacts are predicted to be short term and not significant. Filling the pits may increase the area available for California halibut spawning which can increase catches if other factors do not limit recruitment into the adult population.

Existing commercial or recreational boating facilities and harbor space will not be reduced by the Proposed Project.

Section 30235:

Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.

The Proposed Project is located in an existing industrial port area which includes dredged channels and pits. As such, the Proposed Project will not significantly alter the natural shoreline processes and will result with the filling of pits currently acting as flocculent traps for contaminated sediments (section 4.2 and 4.3 of the attached EIS/R).

VI LAND RESOURCES

Section 30240:

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.

A discussion of environmentally sensitive habitat areas were addressed in Section 30230. As stated, environmentally sensitive habitat areas are not expected to be disturbed.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.

Environmentally sensitive habitat areas were addressed in response to Section 30230. Placement strategies are designed to minimize potential impacts on the California least tern.

Section 30244:

Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

A review of previous investigations focused on the project area identified six shipwrecks that are known to have "accurate" coordinates near the area of potential effects (APE).

A cultural resources survey conducted in March 1995 by Macfarlane Archaeological Consultants identified 31 "magnetic anomalies" during a sonar scan. One location within the dredge area, seafloor target no. 2, may be a shipwreck site, based on its scattered linear debris and related magnetic components. It may be associated with the shipwreck *Cricket No. 1*, built in 1863 and sunk in 1885. This wooden steam sidewheeler was used for towing vessels within Long Beach Harbor and is considered culturally significant (Pierson et al. 1987). Another set of anomalies, seafloor targets 10 and 17, may be associated with a previously identified small vessel 35 feet in length, which has never been sufficiently recorded by sonar to permit an evaluation of significance. Other anomalies including buoys, seafloor cables, rock piles used for breakwater construction or repair, and small seafloor features without related magnetic anomalies identified during the survey are considered insignificant. Another anomaly represented by scattered circular objects is presumed to be a bait barge known to have been lost near this location, and is not considered historically important due to its recent age and lack of historically distinguishing features.

Even though the *Cricket No. 1* is considered to be potentially significant, it has not undergone a formal determination of National Register eligibility process. Further studies are necessary to first verify the identity of seafloor target 2. If the target is identified as the *Cricket No. 1* and it retains sufficient integrity to provide information about the past, a determination of eligibility for National Register listing would need to be formalized. A memorandum of agreement (MOA) between LAD, State Historic Preservation Officer (SHPO), and Advisory Council on Historic Preservation (Council) would need to be executed. The MOA would stipulate development of a treatment plan to mitigate adverse effects on the *Cricket No. 1*. Approval of the treatment plan would be required by LAD, SHPO, and Council. Resources associated with seafloor targets 10 and 17, if significant, would be subject to the MOA guidelines as well.

Dredged sediments would be placed in an existing footprint that has been created in the POLA Pier 400 landfill, in existing man-made borrow pits where sediments have been historically removed for filling uses elsewhere, or in an existing ocean disposal site. Extensive ground disturbances have occurred at all of these sites. Any cultural resources that previously existed have been removed. As a result, no impacts would result from placement of dredged sediments at these sites.

VII DEVELOPMENT

Section 30250:

(a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of the usable parcels in the area have been developed and the created parcels would be no smaller than the average size of surrounding parcels.

The ancillary facilities will be located on a parking lot near adjacent processing facilities and developed in association with the Proposed Project to increase operation efficiencies. The

Proposed Project maximizes use of existing facilities within the Port while minimizing requirements for new development.

(b) Where feasible, new hazardous industrial development shall be located away from existing developed areas.

Ancillary facilities will be constructed near existing facilities and in compliance with local ordinances, state regulations, and federal policies.

If hazardous, toxic, radial waste (HTRW) resources are discovered during construction, work will be suspended in the area until all necessary survey, testing, and remediation is completed pursuant with federal/state regulations.

(c) Visitor-serving facilities that cannot feasibly be located in existing developed areas shall be located in existing isolated developments or at selected points of attraction for visitors.

Not applicable.

Section 30251:

The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character surrounding areas, and where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

The aesthetic character of the project area is composed of a mix of public and commercial water-oriented facilities, dominated by the harbor, restaurants, and shops. Local beaches further add to the overall impression of a recreation-oriented visual setting. The area is well maintained and projects an image to attract the recreation user.

Although adverse aesthetic impacts will occur during project construction, no residual impacts will occur. The proposed project will not result with construction of incompatible structures and alter the current character of the viewshed (Section 4.11 of the attached EIS/R).

Section 30253:

New development shall:

(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.

Not applicable.

(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

Project designs include stringent engineering features to assure geologic stability.

(3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development.

Prior to construction, an Authority to Construct/Permit to Operate would be obtained, if necessary.

For non-attainment areas such as the project area an Air Quality Management Plan (AQMP) was developed for regulating certain ambient air quality standards. The AQMP requires that emissions be reduced until the SCAB reaches attainment of these standards. The emissions from an individual project, when combined with the total SCAB emissions for each source category, must remain below forecasted emission levels, to show consistency with the AQMP.

One of the requirements established by the 1990 Amendments to the Federal Clean Air Act (CAA) was an emission reduction amount, which would be used to judge how progress toward attainment of the ozone standards would be measured. The 1990 CAA requires areas in nonattainment of the NAAQS for ozone to reduce basinwide VOC (or ROC) emissions by 15 percent for the first 6 years and by an average 3 percent per year thereafter until attainment is reached. Control measures must be identified in the SIP that will facilitate the reduction in emissions and show progress toward attainment of the ozone standard.

Although temporary, short-term significant impacts on air quality would occur, the proposed action would increase the efficiency of moving cargo through the POLB over the long term. The larger tankers would be able to enter the POLB fully loaded, so fewer larger ships would be needed to move the same amount of liquid-bulk cargo. The increased efficiency would decrease long-term emissions per ton of cargo throughput, consistent with AQMP strategies to control emissions in the port area.

The deepening of the Queen's Gate approach channel would reduce emissions from both the baseline condition and the no-action alternative. Since fewer ships would move the same amount of cargo, the emissions generated by ships would be reduced. The reduction in ship emissions in the year 2010 would range from a low of 1.17 tons per year of ROC to a high of 96.91 tons per year of SO_x for the baseline conditions, and from a low of 0.89 tons per year of ROC to a high of 72.88 tons per year of SO_x for the no-action alternative.

Projected Annual Ship Emissions Associated with Berth T121 in 2010 (Tons/Year)

Alternative	*CO*	*NO_x*	*PM_{10}*	*ROC*	*SO_x*
Proposed Action	3.50	45.37	12.42	2.62	232.99
Change over Baseline Conditions	-1.69	-19.86	-5.22	-1.17	-96.91
No-Action Alternative	4.81	60.45	16.36	3.51	305.86
Change over No-Action Alternative	-1.31	-15.08	-3.94	-0.89	-72.88

Figures 4.4-1 and 4.4-2 in the attached EIS/R show that project ship emissions in the year 2010 compared to the no-action alternative would be lower, and that the with-project ship emissions are a very small fraction of total ship emissions in the SCAB. With respect to the requirement to reduce basinwide ROC emissions by 3 percent per year after 1996 until attainment is reached, the proposed action would result in a 31 percent reduction in ROC emissions in the year 2010 compared to 1994 levels. In contrast, the no-action alternative would result in only a 7 percent reduction in ROC emissions over the same period. Since the deepening is expected to be completed in approximately 1999 (assuming construction begins in 1997 as planned), the 31 percent reduction in ROC emissions from the proposed action would occur over an 11-year period (1999 to 2010). The project would thus contribute toward the basinwide requirement to reduce ROC emissions 3 percent per year. The project is not expected to affect population densities, locations, and land use patterns identified in the Growth Management Plan, and help decrease long-

term emissions by increasing cargo movement efficiency, therefore, would be consistent with the AQMP.

(4) Minimize energy consumption and vehicle miles traveled.

The design phase of this project has incorporated economically feasible, energy-saving conservation measures for construction-related activities, where feasible.

After construction, the reduced number of tanker calls will result in a long-term reduction in the amount of energy consumed for transport of crude oil.

(5) Where appropriate, protect special communities and neighborhoods which, because of their unique characteristics, are popular visitor destination points for recreational uses.

Not applicable.

Section 30255:

Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.

Proposed construction projects (i.e., channel and ancillary facilities) are coastal-dependent developments and already acceptable uses within the POLB Harbor District. Development will not be sited in wetlands.

DETERMINATION OF CONSISTENCY

The LAD has carefully evaluated the proposed Federal Action in accordance with NEPA and the CZMA. A determination of consistency with the relevant policies of the California Coastal Act for the Proposed Project has been formulated based on the following items:

- An analysis of project construction and the potential for direct adverse impacts to the resources of the coastal zone;

- The formulation and implementation of proposed mitigation measures to offset project impacts; and

- The policies of the State of California related to the Proposed Project as outlined in the findings and declarations of the California Coastal Act of 1976, as amended.

This coastal consistency determination declares that the actions that comprise the Proposed Project (Recommended Plan) are activities that are consistent to the maximum extent practicable with the approved State management program, as specified in the Coastal Zone Management Act of 1972, as amended, Section 307(c)(1). The LAD has determined this project is consistent to the maximum extent practicable with the California Coastal Act of 1976, Chapter 3, Coastal Resources Planning and Management Policies as amended February 1982, for the reasons stated above and in this determination.

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

October 12, 1995

Robert S. Joe
Chief, Planning Division
U.S. Army Corps of Engineers
ATTN: Russ Kaiser
P.O. Box 2711
Los Angeles, CA 90053-2325

Subject: Consistency Determination CD-54-95 (Queens Gate Entrance Channel Deepening, Port of Long Beach, Los Angeles County)

Dear Mr. Joe:

On September 13, 1995, by a vote of twelve in favor and none opposed, the California Coastal Commission concurred with the above-referenced consistency determination for entrance channel deepening at and seaward of the Port of Long Beach in Los Angeles County. The Commission found the project consistent with the California Coastal Management Program.

Sincerely,

LARRY SIMON

Larry Simon
Staff Analyst

cc: South Coast Area Office
NOAA
OCRM
Governor's Washington, D.C., Office
California Department of Water Resources
Port of Long Beach

6454p

Appendix H

CLEAN AIR ACT CONFORMITY ANALYSIS
PORT OF LONG BEACH CHANNEL DEEPENING PLAN
PORT OF LONG BEACH HARBOR,
SAN PEDRO BAY, CALIFORNIA

I. CONFORMITY WITH FEDERAL AIR QUALITY CRITERIA

A. Clean Air Act Overview

This analysis is provided to support the conformity determination for the Port of Long Beach Channel Deepening Project, Long Beach, CA, and demonstrate that this project complies with Section 176(c) of the Clean Air Act, as amended (CAA).

In the Federal Register of November 30, 1993, the U.S. Environmental Protection Agency (EPA) published its final General Conformity Rule to implement Section 176(c) of the CAA for geographic areas designated as "nonattainment" and "maintenance" areas under the CAA. EPA's final rule addresses how Federal agencies are to demonstrate that activities in which they engage conform with applicable, Federally-approved CAA state implementation plans.

The new rule applies generally to Federal actions except for those covered by EPA's transportation conformity rule, actions with associated emissions below the de minimis levels specified at 40 CFR 91.853, certain classes of actions designated at 40 CFR 91.853 as exempted or presumed to conform, and actions that the new rule "grandfathers" at 40 CFR 91.850.

B. Project Overview

The proposed action is a modification of the existing federal navigation project at Long Beach Harbor to allow large crude petroleum tankers to more fully utilize their capacities, thereby improving efficiency and reducing transportation costs. It involves deepening the approach channel outside the Queen's Gate entrance to the Port of Long Beach (POLB) from 60 feet below mean lower low water (MLLW) to 76 feet below MLLW to allow vessels to enter the harbor fully loaded. An area 1,200 feet wide by 14,000 feet long would be dredged. The total volume of dredged material is estimated to be 5.6 million cubic yards (mcy). The material will be placed at the Pier 400 landfill at the Port of Los Angeles (POLA), and possibly two or three man-made borrow pits inside San Pedro Bay. The proposed dredge area and these placement sites are shown in Figure 1-1 of the attached EIS/R.

C. Air Quality Analysis Methods/Impact Analyses

Coordination was conducted by the Corps and the Port with the South Coast Air Quality Management District (SCAQMD), the Southern California Association of Government (SCAG), and the Environmental Protection Agency (EPA) Region IX to scope air quality analyses and establish understandings regarding assumptions and procedures.

The Air Quality Technical Report is provided to agencies for review with the Draft Feasibility Study and EIS/R. Assumptions, methods, and procedures for the analysis are summarized in the EIS/R Section 4.4 and detailed in the Air Quality Technical Report (Appendix C).
Meetings will be held during the public review periods for the draft and final Feasibility Study and EIS/R.

II. CONFORMITY REQUIREMENTS

Section 176(c) of the CCA requires that prior to taking a Federal action, Federal agencies assure that the action conforms to the applicable implementation plan developed pursuant to Section 110 of the Act. Section 176 (c) provides that:

Conformity to an implementation plan means--

(A) conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and

(B) that such activities will not--

i. cause or contribute to any new violation of any standard in any area;

ii. increase the frequency or severity of any existing violation of any standard in any area;

iii. delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Section 176(c) was enacted by Congress to ensure that large Federal projects did not hinder states' efforts in reaching attainment. This provision, for example, encourages the construction of Federal projects that reduce overall emissions, while it discourages those projects that increase emissions. Section 176(c) uses the conformity determination process to determine whether the emissions of the Federal action will help or hinder a state's progress towards attainment.

Section 176(c) serves as the sole source of guidance in this conformity determination, Section 176(c) is open to varying reasonable interpretations.

A. Section 176(c) states that a Federal agency cannot "engage in... any activity which does not conform to an implementation plan after it has been approved or promulgated under Section 110." (emphasis added). This strongly implies that if an implementation plan has not been approved pursuant to Section 110, the Federal agency is relieved of its obligations under Section 176(c).

B. the provision states that: "The assurance of conformity to. . . an implementation plan shall be an affirmative responsibility of the head of such department, agency, or instrumentality." This provision could be reasonably interpreted to allow the Federal agency to rely, at its own discretion, on a conformity analysis or determination prepared by a state agency. Section 176 (c) only requires that the Federal agency involved "assure" that the analysis is accurate and sufficient in its demonstration of conformity.

C. Section 176(c) is silent regarding which emissions need be considered under its three part test. In light of this, the Corps has limited the scope of this conformity analysis to those direct and indirect emission from the proposed improvements which the Corps or the Port could practicably control. These emissions would include those direct emissions from resources including the dredges and construction equipment, as well as from indirect sources such as the cargo transportation equipment and ships.

While we included emissions resulting from the proposed improvements that are within the control of Corps or the Port, we excluded those emissions that are beyond either the Port or the Corps' practicable control, because only the local AQMD has complete authority to limit or regulate such emissions. The SCAQMD and the SCAG in this case are responsible for developing the AQMP; thus, it seems appropriate to rely on these entities to fashion controls for such development consistent with the area's overall plans. Even if the Corps or the Port had the authority necessary to regulate such emissions through permit conditions or otherwise, attempts by the Corps or the Port to do so could well result in inconsistent or disruptive requirements. Furthermore, if the AQMD were already regulating such development, then the Federal efforts would be duplicative.

For example, the Corps would have little authority to control any development that might occur around the Los Angeles Harbor after the proposed improvements are completed. Since the type and degree of development that may occur in these situations is highly speculative, and since the Federal government could have only limited control over this development, it seem inappropriate to take these emissions into consideration.

The underlying principles of the General Conformity Rule is that Federal actions must not cause or contribute to any violation of a National Ambient Air Quality Standard (NAAQS).

III. APPLICABLE IMPLEMENTATION PLAN

The two prerequisite findings that need to be made prior to making a conformity determination under section 176(c) are whether an implementation plan exists, and if one does, whether it can be considered an applicable implementation plan. The EPA has determined that the 1979 SIP is the applicable implementation plan for the South Coast Air Basin (EPA, 1993) for the purposes of section 176(c), and, in its opinion, would be controlling in the conformity determination for the proposed improvements.

Following is a discussion showing project conformity with the 1979 SIP. For completeness, we have used several other approaches to demonstrate conformity, as well. Second, we considered the proposed improvements' emissions in conjunction with SCAG's 1991 AQMP, which appears to be a more accurate vehicle for determining conformity than the 1979 SIP. Finally, we performed a baseline analysis of the proposed improvements' emissions in relation to those that would be emitted if the improvements were not implemented to determine whether the project would hinder this SCAG's attempts to reach attainment.

VI. CONFORMITY ANALYSIS

A. 1979 SIP Conformity Determination Requirements

Section V(A) (8) of the EPA approved 1979 SIP South Coast Air Basin Control Strategy identifies the SCAG as the agency responsible for developing methods for reviewing Federally funded projects for consistency with the SIP, SCAG uses three specific criteria in determining whether a project is consistent with the SIP, whether the action: (1) improves the subregion's jobs-to-housing balance performance ratio, (2) reduces vehicle (vessel) trips and vehicle (vessel) miles traveled to the maximum extent feasible by implementing transportation demand management strategies, and (3) has environmental documentation including an air quality analysis demonstrating the project won't have significant negative long-term impacts. The proposed improvements meet these SCAG criteria, as discussed below:

First, the project is not expected to require in-migration of workers for dredging activities or long-term operations. Employment resulting from construction is projected at 20 persons. This increase would be short-term and could utilize labor available in the region, with no changes to population and housing conditions in the region. (Additional economic benefits would result from purchases of construction materials and other services.) Therefore, the proposed project will improve the subregion's jobs-to-housing balance performance ratio over the construction period and is consistent with the requirements of the SIP.

Second, the proposed project will not impact ground traffic, however, will reduce future vessel trips associated with port facilities. The following table (3-4) shows that for every projected future year (1994 to 2040), the total annual number of vessel trips to Berth T121 will be higher under the no-action alternative than for the with-project condition. Long-term NO_x emissions from tankers would be reduced by 19.9 tons per year from existing (1994) levels and by 15.1 tons per year compared to the no-action alternative in the year 2010. Similarly, long-term ROC emissions from tankers would be reduced by 1.2 tons per year from existing (1994) levels and by 0.9 tons per year compared to the no-action alternative in the year 2010. Emissions of other pollutants, which would not exceed significance thresholds, would also be reduced over the long term. Over the 40-year projection period, total annual vessel trips to Berth T121 are projected to decline 21 percent under the no-action alternative and 44 percent under the with-project condition. Therefore, the proposed project is consistent with this portion of the SIP.

Finally, the EIS/R for the proposed project includes an air quality analysis demonstrating that the project will not have significant adverse long-term impacts on air quality. As noted above, the EIS/R shows that the project creates a net benefit to the air quality of the SCAB. The following figures (4.4-1 and 4.4-2)) illustrate that the operational emissions from the proposed project will be less than those if the project did not occur. Construction will result with a deeper navigation channel, thereby accommodating larger, more efficient ships, which will reduce fuel requirements, decrease emissions, and enhance overall efficiency of cargo transport.

Although construction activities will result in temporary and intermittent increases in air emissions in the project area, these short-term emissions cannot be avoided and are necessary to achieve the long-term air quality benefits of the proposed project.

Construction emissions will be minimized through use of clean fuel dredges or catalytic converter equipped dredges or both for dredging activities. Additional measures to minimize construction emissions include: proper tuning and maintenance of construction equipment, encouraging carpooling of workers, and discontinuing construction activities during Stage II or more severe Smog Alerts. Construction emissions will be temporary, intermittent, and will cease upon completion of construction activities.

In summation, the recommended plan satisfies the three criteria developed by SCAG to determine conformity with the SIP, and therefore, is consistent with it.

Table 3-4

EXISTING AND PROJECTED VESSEL TRIPS TO BERTH T121 (1994-2040)

Ship Size (1000 DWT)	Existing (1994)	2000	2005	2010	2015	2020	2025	2030	2035	2040
No-Action Alternative										
200	50	50	48	45	45	38	35	30	30	28
265	30	29	29	29	29	34	34	35	35	35
SUBTOTAL NO-ACTION	80	79	77	74	74	72	69	65	65	63
With the Project										
200	50	10	10	10	12	13	13	13	12	12
265	30	37	30	22	18	14	11	8	7	6
300	0	5	7	9	10	11	11	11	11	12
325	0	2	2	2	2	3	3	3	2	2
365	0	5	7	9	10	12	12	12	12	13
SUBTOTAL WITH-PROJECT	80	59	56	52	52	53	50	47	44	45

Source: *Long Beach Main Channel Economic Analysis* (COE 1995). Trips for future years have been rounded to the nearest whole number.

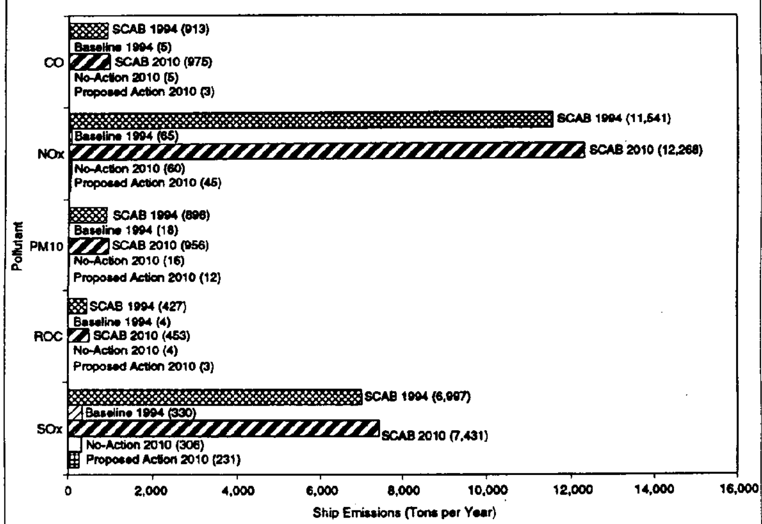


Figure 4.4-1. Comparison of Ship Emissions for the Proposed Action, No-Action, and South Coast Air Basin (SCAB) by Pollutant for the Years 1994 and 2010

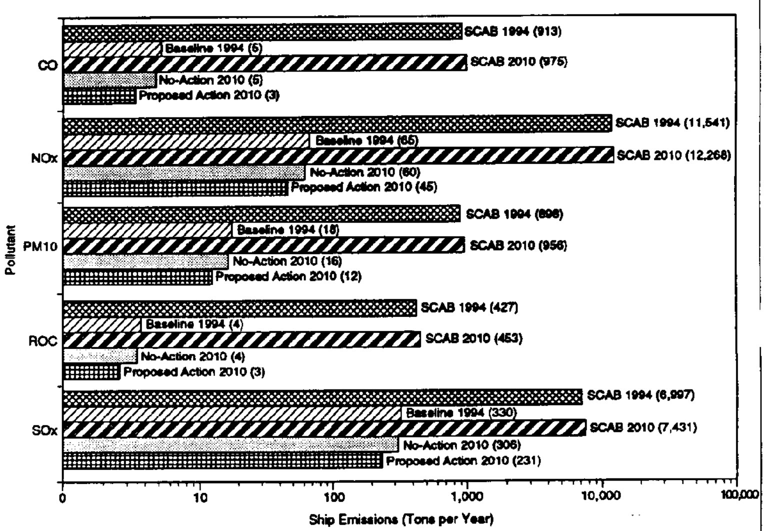


Figure 4.4-2. Comparison of Ship Emissions for the Proposed Action, No-Action, and South Coast Air Basin (SCAB) by Pollutant for the Years 1994 and 2010 (logarithmic scale)

B. Conformity with the 1991 Air Quality Management Plan

The next approach the Corps used to determine conformity was to examine whether the proposed improvements will be consistent with the 1991 AQMP. As explained above, the 1991 AQMP was prepared by the SCAQMD and the SCAG to meet the NAAQS and the California Ambient Air Quality Standards, which are more stringent than the NAAQS. Although the 1991 AQMP has not been submitted to the EPA for Approval, it has been conditionally approved by the California Air Resources Board. The 1991 AQMP included the most recent emission inventory for the SCAB; therefore, the Corps determined that it was highly relevant to this conformity determination.

Project Consistency with AQMP

An Air Quality Management Plan (AQMP) for the SCAB was developed because the area is in non-attainment of certain ambient air quality standards, as discussed in section 4.4.1 of the attached EIS/R. The AQMP requires that emissions be reduced until the SCAB reaches attainment of these standards. Thus progress toward attainment is demonstrated in the AQMP by implementing control measures defined in the AQMP and by showing a decrease in future SCAB emission inventories. The emissions from an individual project, when combined with the total SCAB emissions for each source category, must remain below the forecasted emission levels, to show consistency with the AQMP.

One of the requirements established by the 1990 Amendments to the federal Clean Air Act (CAA) was an emission reduction amount, which will be used to judge how progress toward attainment of the ozone standards will be measured. The 1990 CAA requires areas in nonattainment of the NAAQS for ozone to reduce basinwide VOC (or ROC) emissions by 15 percent for the first 6 years and by an average 3 percent per year thereafter until attainment is reached. Control measures must be identified in the SIP that will facilitate the reduction in emissions and show progress toward attainment of the ozone standard.

Although temporary, short-term significant impacts on air quality will occur, the proposed action will increase the efficiency of moving cargo through the POLB over the long term. The larger tankers will be able to enter the POLB fully loaded, so fewer larger ships will be needed to move the same amount of liquid-bulk cargo. The increased efficiency will decrease long-term emissions per ton of cargo throughput, consistent with AQMP strategies to control emissions in the port area. In Figure 4.4-1, baseline (1994) emissions for both ships that will be affected by the project (i.e., ships docking at Berth T121) and all ships in the SCAB area (per the AQMP) are compared to projected ship emissions in the year 2010 under the proposed action, the no-action alternative, and for the SCAB area (per the AQMP). Because ship emissions under both the with-project condition and the no-action alternative are so much lower than total ship emissions in the SCAB, Figure 4.4-2 shows the same comparison using alogarithmic scale. Emissions are rounded to the nearest ton in these figures so they do not reflect changes in emissions of less than a half-ton between the years 1994 and 2010.

Figures 4.4-1 and 4.4-2 show that the project will result in lower ship emissions in the year 2010 compared to the no-action alternative, and that the with-project ship emissions are a very small fraction of total ship emissions in the SCAB. With respect to the requirement to reduce basinwide ROC emissions by 3 percent per year after 1996 until attainment is reached, the proposed action will result in a 31 percent reduction in ROC emissions in the year 2010 compared to 1994 levels. In contrast, the no-action alternative will result in only a 7 percent reduction in ROC emissions over the same period. Since the deepening is expected to be completed in approximately 1999 (assuming construction begins in 1997 as planned), the 31 percent reduction in ROC emissions from the proposed action will occur over an 11-year period (1999 to 2010). While the project will not show a 3 percent annual reduction in ROC emissions, the CAA does not require each project to show a 3 percent reduction, only that *basinwide* there be a 3 percent reduction. The project will thus contribute toward the basinwide requirement to reduce ROC emissions 3 percent per year.

Because the project does not affect population densities, locations, and land use patterns identified in the Growth Management Plan, and helps decrease long-term emissions by increasing cargo movement efficiency, the project will be consistent with the AQMP.

C. Baseline Emissions Analysis

In performing this conformity analysis, the Corps also examined, independent of any air quality or implementation plan, how the proposed improvements will affect air quality in the SCAB over the short- and long-term. The Corps based its analysis on certain premises: first, that the Long Beach Harbor will continue to grow regardless of the proposed improvements; second, that this growth will cause attendant increases in emissions; and third, that the appropriate types of emissions to consider were those direct and indirect emissions over which the Corps and the Port will have control.

Because the emission, from the Long Beach Harbor will persist whether with or without the proposed improvements, the Corps determined that the only sensible way to determine the long-term effect of the proposed improvements on air quality is to compare the estimated emissions of the improvements with the forecasted emissions of the harbor if the improvements are not made (Figures 4.4-1 and 4.4-2). The Corps made these comparisons at several different future time periods to assess long-term effects of the proposed improvements. The Corps' analysis demonstrates that the no action emissions will be worse for any given year if the improvements are not constructed. If, for instance, after completion of the proposed project, the harbor were to be forced to assume a zero emissions growth schedule, the project will ensure a lower level of emissions, or a greater level of cargo for the same emissions, than if the improvements were not made.

The long-term air quality benefits of the proposed project stem from the various efficiency-enhancing characteristics the project will make overall to the Port of Long Beach. By deepening the proposed channel, the number cargo vessel trips will be reduced, hence the emissions per unit of cargo handled will be decreased. The efficient transport of cargo minimizes impacts to transportation movement and thereby minimizes air quality impacts to the region. The proposed project is beneficial to the long-term air quality of the SCAB.

The only emissions that can not be completely offset in the short-term are those resulting from the construction of the deepened channel. Construction activities will result in temporary and intermittent increases in air emissions in the harbor area and will cease upon completion of construction. These short-term increases in emissions cannot be avoided and are necessary in order to achieve the long-term air quality benefits associated with the proposed project. Furthermore, these construction emissions will be minimized through the implementation of various mitigation measures.

VII. CONCLUSIONS

As discussed above, the EIS/R clearly illustrates that operational emissions from the proposed project will be less than those which will occur if the project is not constructed. Project construction will deepen the existing navigation channel to accommodate larger, more efficient ships, resulting in more efficient transportation of cargo. The efficient transportation of cargo minimizes air quality impacts within and around the harbor.

Although construction activities will result in temporary and intermittent increases in air emissions in the project area, these short-term increases in emissions cannot be avoided and are necessary in order to achieve the long-term air quality benefits associated with the proposed project. Construction emissions will be minimized through the implementation of various mitigation measures included in the proposed action and EIS/R, and will cease upon completion of construction activities. Based on coordination with SCAG (Blossom, SCAG, pers. comm., 5-22-95), the SIP for the South Coast Basin does not require inclusion of short term construction impacts for the findings of a conformity determination, pursuant with the CAA.

Operational emissions associated with implementation of the proposed project will be less than those that will occur if the Project is not built. Therefore, the proposed project is anticipated to be beneficial to the long-term air quality of the SCAB, and will not interfere with the attainment of the NAAQS.

Upon comprehensive review of the proposed action, the Corps concludes this project conforms to the 1979 SIP, the 1991 AQMP, and the applicable Federal Implementation Plans. Implementation of the proposed project conforms to the Plans' purposes of eliminating or reducing the severity and number of violations of NAAQA and achieving expeditious attainment of such standards as required by Section 176(c)(1)(A) of the Clean Air Act, as amended. Further, based on the analyses presented in the EIS/R and herein, it is anticipated that the operation of the harbor after the proposed improvements are complete will not:

1. Cause or substantially contribute to any new violation of pollutants for which the SCAB is in attainment;

2. Increase the frequency or severity of the existing violations of nitrogen dioxide, carbon monoxide, ozone, and particulate matter standards in the SCAB; or

3. Delay timely attainment of any standard or interim emission reductions or other milestones required by the 1990 CAA Amendments in the SCAB.

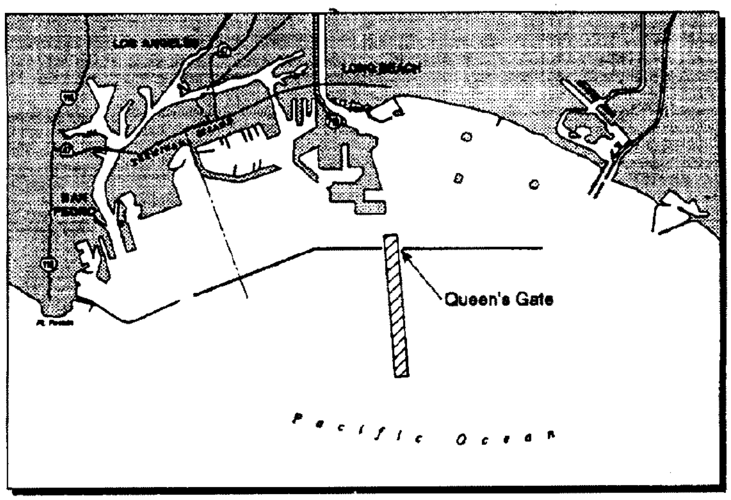
The landside development associated with the proposed project will be reviewed again by the SCAQMD and SCAG prior to implementation. This will ensure that as development occurs and air quality regulations change, the projects will remain consistent with the applicable SIP and local air quality management plans for the region.

For the reasons provided above in this conformity analysis, I conclude that the proposed project conforms to the applicable SIP, are consistent with the 1991 AQMP, and will lead to air emissions benefits over the no action alternative. In light of this, I also conclude that the proposed project is in compliance with section 176(c)(1) of the CAA, as amended.

Michal R. Robinson
Colonel, Corps of Engineers
District Engineer

Final Feasibility Study

PORT OF LONG BEACH
Main Channel Deepening



Appendix E
Economics

Sep 1995

CONTENTS

TABLES

LIST OF FIGURES

PURPOSE

The purpose of this project is to assess the need for navigation improvements in the form of deeper channels and turning basins to allow large crude oil tankers to access Berth 121 in Long Beach Harbor (Figure E-1). Berth 121, Pier E in Long Beach Harbor is the off-loading point for 75-80% of the total crude petroleum shipments passing through the combined Ports of Long Beach and Los Angeles. A majority of this petroleum is currently shipped from Alaska. The terminals at this berth consist of pipeline connections for crude petroleum off-loading, pumping facilities, and crude petroleum storage tank farms.

Existing channels to Berth 121 in Long Beach Harbor are limited to 60 feet in depth. As a result, it is currently necessary to light-load larger tankers and use high tides to permit even partially-loaded tankers to reach the berth.

Without-Project Condition

Existing Navigation Features

The Main Report discusses the condition for analysis of Harbor improvements and is briefly summarized here. The Port of Long Beach has requested reimbursement for channel dredging they completed as part of the Pier J Expansion Project. The determination of this reimbursement requires an analysis of the general navigation features that would have been built as part of a Federal project and the Federal cost-sharing of these features. Accordingly, the baseline condition for economic analysis considers pre-Pier J construction as shown in Figure E-2 and Table E-1. As Tables E-1 and E-2 indicate, the baseline channel is wider and deeper than the authorized Federal project, due in part to subsidence and in part to local dredging projects. The baseline condition channel depth and width (700 feet) limits access to Berth 121 for fully loaded vessels in the existing fleet (using tides) to tankers with a draft of 57 feet (173,000 DWT fully loaded). Large vessels must therefore enter the harbor light-loaded. Vessels of 188,000 DWT light-load by 90,000 barrels in order to reduce their draft to 56 feet. The depth of the channel and berthing area adjacent to Berth 121 is 76 feet MLLW; the terminal itself could therefore accommodate fully loaded vessels of up to 265,000 DWT (max. draft 69 feet) without improvements. The harbor area is protected by the federally maintained San Pedro, Middle, and Long Beach breakwaters. No improvements to these features are proposed. Federally maintained anchorage areas within the breakwater are currently used for bunkering, awaiting berth, and supply loading. Tenants operating Berth 121 have expressed desires to utilize deeper channels if provided.

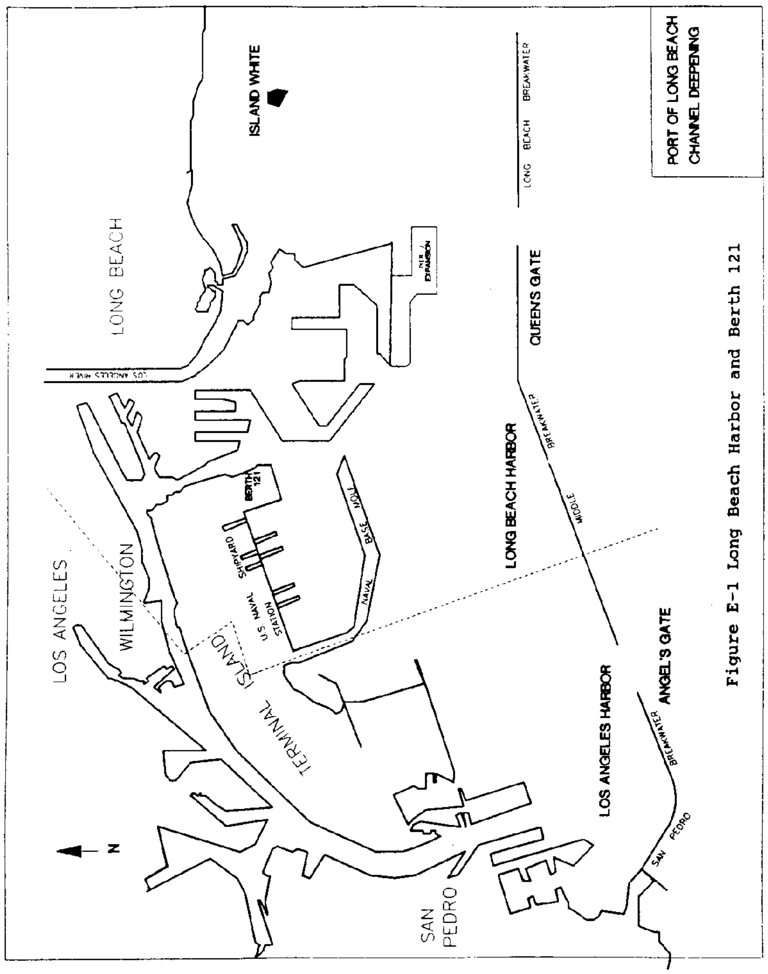


Figure E-1 Long Beach Harbor and Berth 121

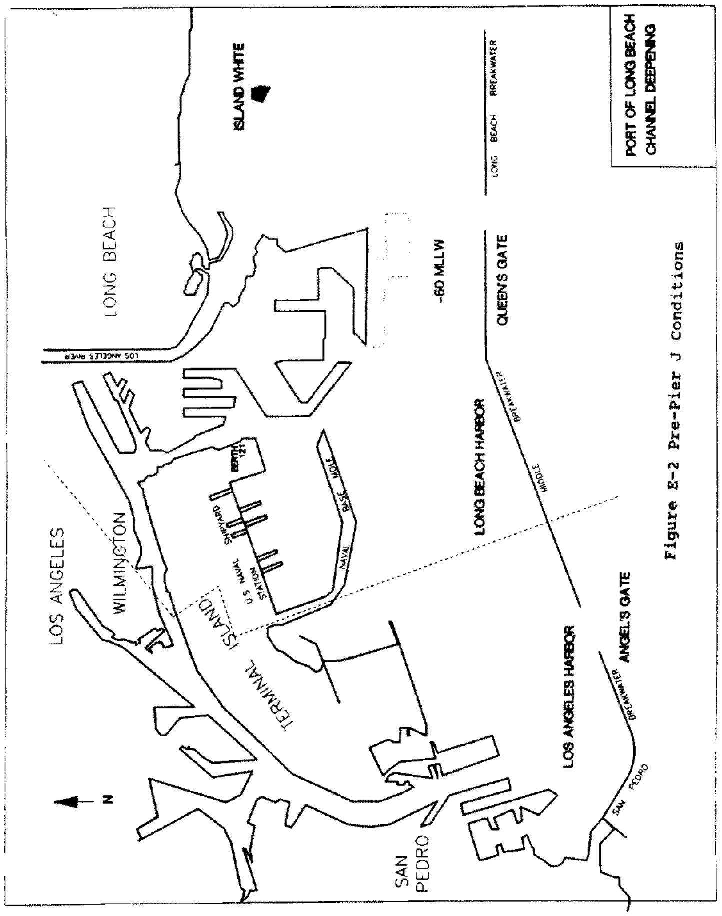


Figure E-2 Pre-Pier J Conditions

39-785 97 - 17

Bathymetry

Dredging to deepen and widen the Long Beach Channel would involve work in soft-bottom/open water areas of the harbor with natural depths of greater than 50 feet; no shallow water habitat would be affected by this project. In the area adjacent to the existing channel, depths range from 60 to 78 feet outside of the harbor entrance. Channel depths range from 42 to 73 feet from the harbor entrance to Pier J, and from 37 to 57 feet along the channel from Pier J to the turning basin. At the turning basin, the areas adjacent to the channel are from 55 to 60 feet deep. The channel in the constrained narrows at Pier E is dredged to 76 feet from Pier E to the opposite Pier D.

TABLE E-1

CHANNEL DEPTHS AND WIDTHS, LONG BEACH CHANNEL

Reach	Berth Channel Depth*		
	Authorized (ft, MLLW)	Width (ft)	Actual (ft, MLLW)
Outside of Breakwater	35	500	60+
Main Channel	35	Varies	60
Turning Basin	35		76
Berth 121	35	300	76

***Depths greater than authorized project depths are a result of subsidence and/or local dredging.**

Trade Routes

The primary trade route served by crude oil tankers using Berth 121 is the Alaska Route, 2,240 miles one-way. Alaskan crude oil dominates the Berth 121 trade for a number of reasons, including existing refinery operations. As Alaskan crude oil reserves decline in the near future, it is anticipated that there will be a steady shift towards distant sources. Trade route distances to the primary destinations are shown in Table E-2.

TABLE E-2

TRADE ROUTE DISTANCES

Trade Route	Distance (miles)
Alaska	2,240
Far East	8,250
Persian Gulf	11,575
Source: WEFA San Pedro Bay Cargo Forecasting Project, 2020	

The Census Bureau of Records was consulted to determine historic shipments to foreign ports. A list of the ports expected to be on the trade routes for the Persian Gulf and Far East and their maximum operating draft (including any usable tide and using a minimum safe underkeel clearance) is shown on Table E-3 and E-4. The actual ports of call vary depending on existing contracts with shippers, energy policy, and buying practices. The ports listed have been or may be used at any time depending on these variables.

Table E-3

MAJOR FAR EAST CRUDE EXPORTING PORTS

Country and Port	Max Operating Draft (ft)
Sriracha, Thailand	50
Singapore, Singapore	74
Sumatra	
Kerteh	66
Miri	55
Palau Sambu Island,	29
Moluccas	26
Bangkok, Thailand	56
Dumai, Moluccas	71
Huangdao, N. China	

Table E-4

MAJOR PERSIAN GULF CRUDE EXPORTING PORTS

Country and Port	Max Operating Draft (ft)
Juaymah, Saudi Arabia	103
Jubail, Saudi Arabia	98
Rastanura	69
Kharg Island, Iran	92
Fateh, U. Arab Emirates	100
Zirku Is, U. Arab Emirates	88

System Facilities

Berth 121 (Figure E-1) has capacity to handle 500,000 barrels of crude oil per day, with direct pipelines to major refineries ARCO, Unocal, and Ultramar. This capacity compares with the current and projected annual throughput of crude oil for both Ports to a maximum of approximately 20,500,000 metric tons. Existing facilities are thus adequate to accommodate projected shipments. Additional improvements to terminal facilities are anticipated including some enhanced tankage and scheduled maintenance and replacement to ensure safety and efficiency. Facility improvements would be necessary for vessels over 265,000 DWT, primarily for tankage. Vessels requiring deeper than existing draft of -76 feet MLLW would require additional berthing facilities.

CARGO

Existing

Berth 121 is used almost exclusively for receipt of crude oil shipments. Since 1974 a majority of the crude oil passing through the combined harbors has been Alaskan, in part because of restrictions on the export of crude oil from the north slope (Beaufort Sea). In 1987, 90% of the throughput for Berth 121 was Alaskan crude oil (90% of 14.4 million metric tons). Throughput at Berth 121 peaked at 19.3 MMT during the oil embargo and subsequent period of oil shortages on the west coast in 1980. Since that time, imports declined and then rose slightly. Table E-5 indicates throughput over the last decade.

TABLE E-5

HISTORIC THROUGHPUT, BERTH 121

Year	Throughput in Metric Tons
1984/85	13,007,000
1985/86	14,175,000
1986/87	14,318,000
1987/88	15,848,000
1988/89	17,465,000
1989/90	17,869,000
1990/91	16,115,000
1991/92	16,906,000
1992/93	15,614,000
1993/94	15,699,000

In recent history, Berth 121 handled up to 80% of total crude oil imports to the Ports. This is primarily a result of channels which allow deeper draft vessels to take advantage of a shift to Alaskan sources in the mid-1970's when North Slope oil reserves became available. Prior to development of North Slope reserves Berth 121 handled from 40-60 percent of total crude oil throughput (Table E-6). Contracts with refineries that shifted from Los Angeles to Long Beach Harbor have stabilized this throughput at 75 to 80% of total crude over the last decade.

TABLE E-6

HISTORICAL THROUGHPUT OF CRUDE (SHORT TONS)

Year	LB	LA	Total Foreign Imports	% Split LB	% Split LA	LB	LA	Total Domestic Imports	% Split LB
1970	2,314,397	1,612,828	3,927,225	59%	41%	4,309,900	2,439,983	6,749,883	62 %
1971	3,500,680	3,639,572	7,140,252	49%	51%	4,424,244	2,668,878	7,093,122	56 %
1972	3,923,813	4,195,742	8,119,555	48%	52%	3,885,471	2,021,283	5,906,754	56 %
1973	6,823,131	5,624,753	12,447,884	55%	45%	4,038,674	1,916,169	5,954,674	69 %
1974	6,275,112	6,032,727	12,307,839	51%	49%	4,269,474	1,843,650	6,113,124	57 %
1975	7,974,916	9,369,331	17,344,247	46%	54%	3,988,238	2,174,606	6,162,844	51 %
1976	11,001,389	8,078,695	19,080,084	58%	42%	3,690,965	2,269,991	5,960,956	59 %
1977	12,455,313	9,568,700	22,024,013	57%	43%	4,436,396	3,136,028	7,572,424	57 %
1978	3,954,642	7,551,810	11,506,452	34%	66%	9,984,975	4,808,935	14,793,910	55 %
1979	2,996,422	5,353,351	8,349,773	36%	64%	11,152,061	6,955,048	18,107,109	53 %
1980	3,613,981	3,557,306	7,171,287	50%	50%	15,615,412	5,301,958	20,917,379	68 %
1981	2,740,881	2,388,225	5,129,106	53%	47%	13,612,081	3,689,397	17,301,478	73
1982	1,183,054	1,078,054	2,261,108	52%	48%	14,406,675	3,902,125	18,308,800	76 %
1983	1,075,131	1,430,086	2,505,217	43%	57%	15,384,693	2,786,207	18,170,900	80 %
1984	952,732	1,198,730	2,151,462	44%	56%	16,375,837	2,826,351	19,202,188	81 %
1985	732,741	964,021	1,696,762	43%	57%	15,506,991	2,640,683	18,147,674	82 %
1986	591,458	555,076	1,146,534	52%	48%	16,387,164	3,683,612	20,070,776	81 %

Source: Waterborne Commerce of the United States, Years 1970-1986.

Projected Cargo Throughput

Projected throughput for the San Pedro Bay Ports (Table E-8) were based on the following assumptions:

1. The energy requirements of the United States and the LA/LB market area will continue to increase over the forecast period. Crude petroleum imports are expected to meet a portion of these needs, but will be limited to existing refinery capacity in the basin. Strict air quality constraints will shift the dependence to petroleum products. The actual imports for crude petroleum will see slight growth until 2020, where demand decreases. Overall changes are less than 1% over time.

2. The share of crude petroleum imports passing through Berth 121 will be at 80% of the total due to existing needs of the refineries serviced by the berth. There are no recognized

factors that would cause a shift in this share. As the source shifts from Alaska to the Persian Gulf and Far East, Berth 121 will be the most efficient choice for deep draft vessels to call, based on both existing channels, and refinery needs. Similarly, additional allocation to this berth is not expected because of refinery needs by the berths within the Port of Los Angeles.

While a majority of crude oil shipments through Berth 121 currently originate in Valdez, Alaska (distance: 2,240 miles), shipments from Alaska are anticipated to decline rapidly as existing reserves are consumed, with a resulting shift to sources in other areas, primarily the Persian Gulf (distance: 11,575 miles). As Table E-8 indicates, shipments are also anticipated to arrive from a number of other sources.

The figures shown on Table E-8 were initially projected by Wharton Econometrics Forecasting Associates (WEFA) as part of the 2020 Plan, and then updated to the year 2040 by WEFA for this study. The figures in Table E-8 are based on no development of oil and gas on the Arctic National Wildlife Reserve (No-ANWR). The No-ANWR scenario was used for the following reasons. First, development is currently restricted by law. Second, given pipeline corrosion problems and the impact of recent oil spills, it is not considered likely that development will be authorized in the foreseeable future. Third, environmental studies necessary before specific development projects may be initiated are not complete. Finally, there are adequate supplies of oil from other sources; the destabilized market conditions which once encouraged development of north slope reserves are not foreseen at this time. Development of petroleum resources in the ANWR area is thus highly unlikely in the near-term. In any case, the total forecast quantity remains the same. The difference between the two scenarios is when the Alaska reserves are depleted. Figure E-3 shows two independent projections of Alaskan Crude production, and Figure E-4 shows two independent projections of Berth 121 receipts from Alaska over the next 20 years. It can be seen that there is very little discrepancy in both cases.

Figure E-3 Alaskan Crude Production Projections

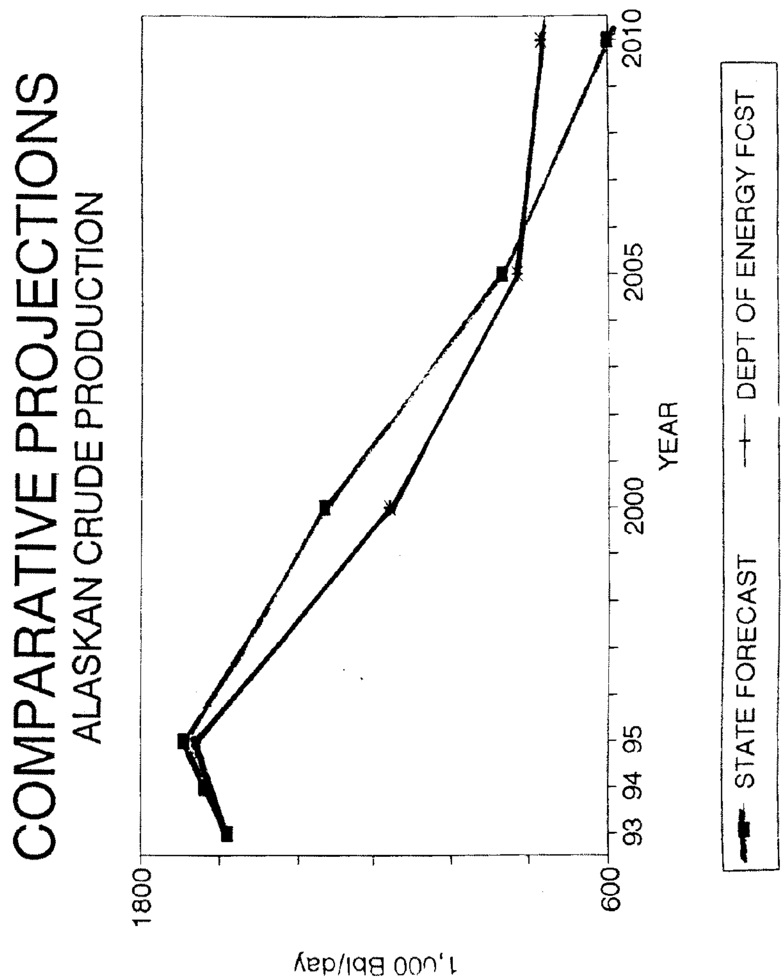


Figure E-4 Berth 121 Alaskan Receipt Projections

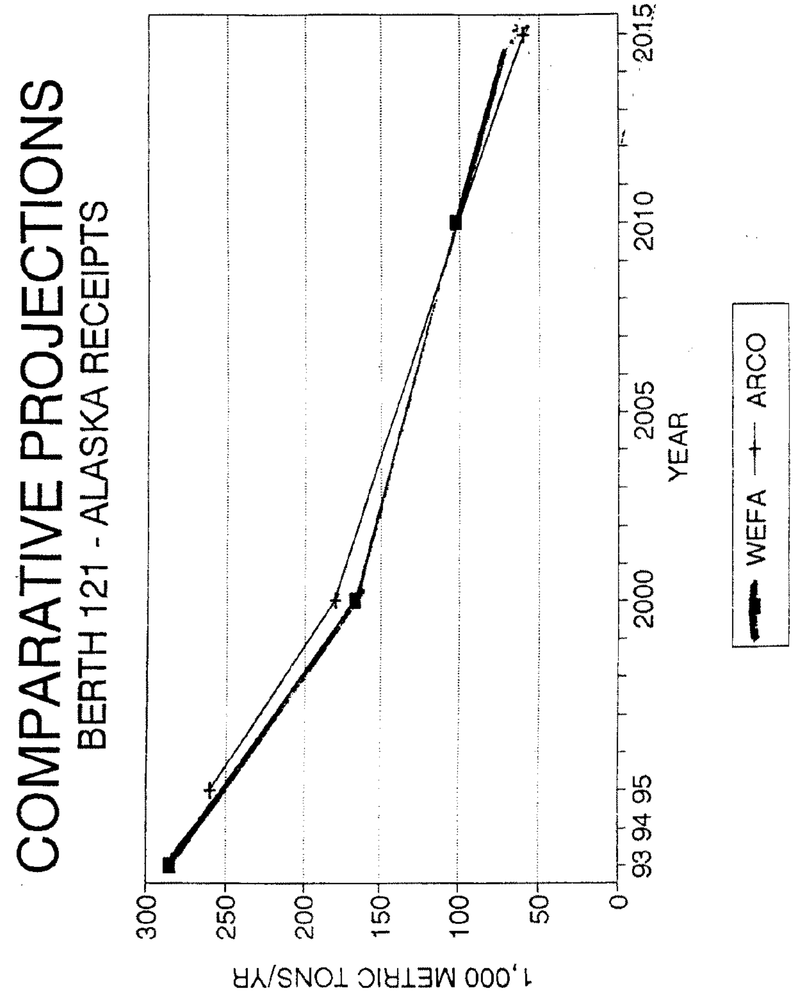


TABLE E-8

CRUDE PETROLEUM SHIPMENTS, BY TRADE ROUTE
1990-2040, LA/LB HARBORS
WEFA

Trade Route	Dist (miles)	Imports (1,000's metric tons)					
		1990	2000	2010	2020	2030	2040
Far East	8,250	1,300	1,600	1,200	1,000	900	800
Per. Gulf	11,575	9	4,000	7,250	9,000	9,250	10,000
Alaska	2,240	16,071	10,582	6,439	3.961	2,295	1,887
Other Domestic		1,344	1,213	1,148	1,274	1,612	1,421
SE Asia		219	935	1,000	1,718	1,818	1,500
Lat. Am.		9	1,463	3,032	3,460	2,615	2,451
Total		18,953	19,793	20,069	20,413	18,239	18,009

Shipments from Latin America and domestic sources other than Alaska would not be limited by existing channel depths, since vessels are currently limited by the foreign port. The throughput from the Far East and South East Asia, Persian Gulf, and Alaska is thus the only element of this trade of concern for determining the feasibility of navigation improvements to Berth 121. In addition, market share must be considered.

Historically, Long Beach Harbor took a smaller share of the trade from sources other than Alaska. Berth 121 increased its share of the total throughput of crude petroleum when Alaskan oil began to dominate in the late 1970's. It has been assumed that Berth 121 will retain its current share of total trade because of the needs of the users (refineries) which receive shipments through Berth 121. The current distribution of crude petroleum deliveries to the Ports, and the distribution assumed for the period 1990-2040 (Table E-9), is 80% Port of Long Beach, 20% Port of Los Angeles. The trade routes of Latin America and "other domestic" will not benefit from channel deepening at the Port of Long Beach due to the draft limitations of the foreign ports, and were therefore not considered in the economic analysis.

TABLE E-9

PROJECT CRUDE PETROLEUM IMPORTS 1990-2040
BERTH 121, BY TRADE ROUTE, ASSUMING NO DEVELOPMENT
OF ANWR PETROLEUM RESOURCES

Trade Route	Imports (1,000's metric tons)						
	1990	2000	2010	2020	2030	2040	2050
Far East and SE Asia	1,224	2,028	1,760	2,174	2,174	1,840	1,840
Alaska	12,857	8,465	5,152	3,169	1,836	1,470	1,470
Persian Gulf	7	3,200	5,800	7,200	7,400	8,000	8,000
Total	14,088	13,693	12,712	12,543	11,410	11,310	11,310

Forecast by Foreign Port

The allocation of crude was further subdivided by country and port to take into account individual port capabilities and ship allocation. The Persian Gulf region allocation was developed from analysis of production rates of proven oil reserves as shown in Figure E-5. The average annual production of each country in the region (2 percent of that country's proven reserves) was determined and each country's percentage of the regional total was applied to the total WEFA production to determine future cargo allocation by country. This was further allocated to individual ports by assessing Bureau of Census data and by assigning cargo to ports within a country in the same proportion as the Census records. For example, In some cases where the Census data was given by country but not by port, equal percentages of the cargo were assigned to the major oil exporting ports within that country. The Far East allocation was calculated by the same methodology. The ports were grouped by maximum operating draft at the oil terminals (from Lloyd's Ports of the World 1994) and then weighted by historical shipments as shown in Table E-10.

TABLE E-10 HISTORICAL SHIPMENTS - BY PORT MAXIMUM DRAFT

MAJOR PERSIAN GULF CRUDE EXPORTING PORTS

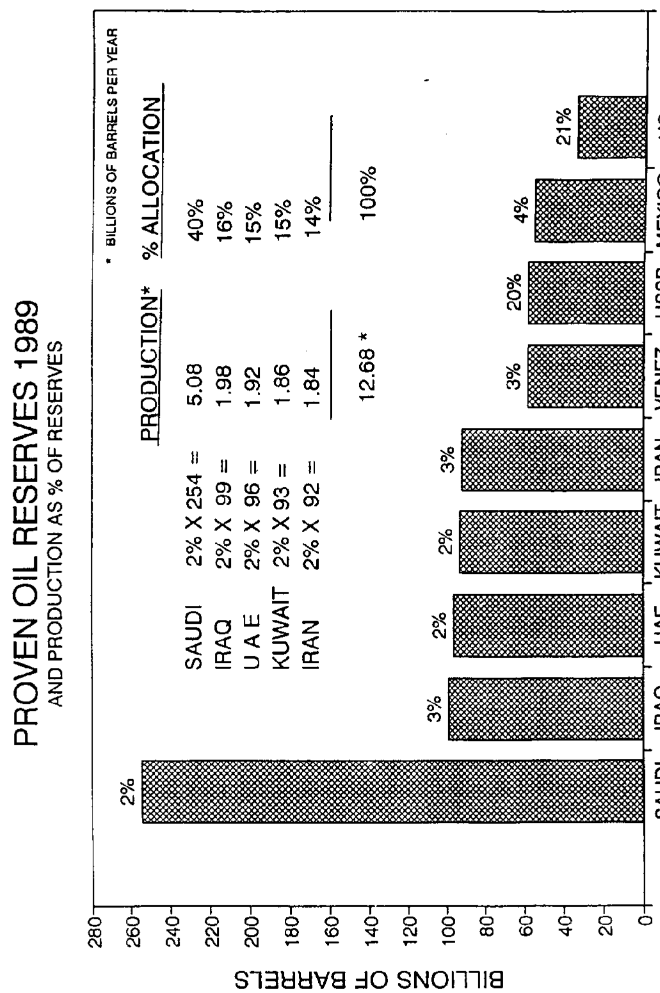
MAX O DRAFT (ft)	PORT NAME, COUNTRY	TOTAL IMPORT 1988-1991	SPLIT BY PORT	SPLIT B NATION	PERCENT OF LA/LB	MAXIMUM OPERATING DRAFT (ft)	% OF LA CARGO CONSTRAINED	DRAFT CONSTRAINT GROUPINGS (APPROXIMATE WEIGHTED
	SAUDI ARABIA			40.0%		103	3.4%	AVERAGES)
69	RAS TANURA	14105810	66.7%		26.7%	100	3.0%	
103	JUAYMAH	1786621	8.5%		3.4%	98	2.5%	
	OTHER SAUDI	5240990	24.8%		9.9%	95	2.5%	25% - 90' OR DEEPER
	TOTAL	21133421				92	7.0%	
	SPLIT OTHER BETWEEN					89	8.0%	
98	JUBAIL		6.2%		2.5%	88	3.0%	15% - 86' TO 90'
95	KING FAHD		6.2%		2.5%	85	7.5%	
66	RAS AL KHAFJI		6.2%		2.5%	79	3.0%	10% - 75' TO 86'
69	RAS TANURA		6.2%		2.5%	78	7.0%	
						76	3.0%	
	IRAN			14.0%		71	8.0%	40% - 69' TO 75'
92	KHARG ISL.		50.0%		7.0%	70	3.0%	
78	SIRRI ISL.		50.0%		7.0%	69	26.7%	
						69	2.5%	
	IRAQ			16.0%		65	2.5%	10% - 61' TO 69'
71	KHOR AL AMAYA		50.0%		8.0%	55	7.5%	
69	MINA AL BAKR		50.0%		8.0%			
	KUWAIT			15.0%				
85	MINA AL AHMADI		50.0%		7.5%			
55	MINA SAUD		50.0%		7.5%			
	U. ARAB EMIRATES			15.0%				
70	ABU AL BUKHOOSH		20.0%		3.0%			
79	DAS ISLAND		20.0%		3.0%			
100	FATEH TERMINAL		20.0%		3.0%			
76	MUBAREK ISL.		20.0%		3.0%			
88	ZIRKU ISLAND		20.0%		3.0%			

(*) = CARGO IMPORTED FROM PERSIAN GULF TO MAJOR GULF COAST AND EAST COAST PORTS

FAR EAST CRUDE IMPORTS TO LA/LB 1988-1991

PORT NAME, COUNTRY	AVG ANN WT	PCT OF TOTAL	MAXIMUM OPERATING DRAFT (ft)	% OF LB CARGO CONSTRAINED	DRAFT CONSTRAINT GROUPINGS (APPROXIMATE WEIGHTED AVERAGES)
DUMAI, MOLUCCA	544,962,765	32.7%	131.2	2.9%	
OTHER MALAYSIA	215,245,105		114.8	2.9%	
LABUAN-SBM		4.3%	91.8	2.9%	
MIRI		4.3%	85.3	2.9%	12% DEEPER THAN 75
BINTULU		4.3%	75.1	4.5%	
OTHER INDONESIA	190,705,540		74.1	4.3%	13% - 70' TO 75'
ARJUNA		2.9%	72.2	3.9%	
BIMA		2.9%	69.9	3.4%	
LAWE-LAWE		2.9%	66.9	4.1%	7% 60' TO 70'
SANTAN		2.9%	57.1	2.7%	
OTHER SUMATRA	135,641,969		57.1	32.7%	
MIRI		4.1%	55.8	4.3%	
KERTEH		4.1%	55.8	4.1%	45% 55' TO 60'
BANGKOK, THAILA	119,029,458	7.1%	52.5	4.3%	
OTHER PHILIPPINE	112,434,000		50.2	4.2%	
LIMAY		3.4%	49.2	2.5%	
MARIVELES		3.4%	37.1	3.4%	
SINGAPORE, SINGA	74,949,251	4.5%	32.8	3.3%	
SRIRACHA, THAIL	69,285,831	4.2%	26.2	7.1%	24.7% TO OTHER BERTHS
HUANGDAO, N. CH	65,508,430	3.9%			
DJAKARTA, SULA	54,893,047	3.3%			
SERIA, BRUNEI	44,923,800	2.7%			
SENIPAH, INDONES	41,508,350	2.5%			

Figure E-5 Proven Oil Reserves and Production Rates



FLEET

Vessel Operations

Tankers approach the harbor through Queens Gate under their own power at a maximum speed of 5 knots. Tug assistance begins from the entrance through all reaches of the channel. Once in the harbor, maximum speed in the channel is 3-5 knots. Pilot services indicate that fully loaded tankers of 173,000 DWT delay entrance until enough tide (up to +3 feet MLLW) occurs to provide minimum (7% to 10% of vessel draft) underkeel clearance. This occurs at least once in every 24 hour period. Larger tankers are light-loaded or must delay entrance until a higher tide occurs. This constraint generally limits deliveries to vessels smaller than 188,000 DWT, although there have been some vessel calls each year by larger vessels. Near the terminals, tankers are assisted by tugs and operate at 3 knots or less.

Existing

Vessels serving Berth 121 currently range from 70,000 DWT to 262,000 DWT, with a majority of deliveries made by two vessels of 188,000 DWT, and two vessels of 262,000 DWT (Table E-11).

TABLE E-11
EXISTING VESSEL FLEET, BERTH 121 CALLS AND DELIVERIES
FOR JULY, 1991 THROUGH NOVEMBER, 1994

Vessel Name	DWT	Drft	No. of Calls	#of call w/max load	Deliveries Metric Tons (1,000)	% Total
Arco Spirit	262	67.2	45	44	9,620	22%
Arco Independence	262	67.1	46	45	10,224	23%
Exxon Long Beach*	215	64.5	6		292	1%
B.T. San Diego	191	59.3	31		NA	NA
B.T. Alaska	191	59.3	5		854	2%
Arco California	190	59.3	64	47	9,997	22%
Arco Alaska	190	59.3	68	45	10,821	24%
Thompson Pass	174	57.3	10		1,013	2%
Brooks Range	174	57.3	6		713	2%
Atigun Pass	153	57.3	10		1,024	2%

* This vessel offloads only a portion (50,000 MT) of it's load at B121, then proceeds to San Francisco area.

Existing operations emphasize use of the largest, most efficient vessels which can be accommodated by existing navigation channels, with over 94% of cargo delivered by vessels which must be light-loaded or lightened, and which must use high tides to enter the harbor. These vessels, now in the trade route from Alaska to Long Beach, are the ARCO Spirit, Arco Independance, Exxon Long Beach, BT San Diego, BT ALaska, ARCO Alaska and ARCO California. In short, crude petroleum carriers appear to choose the largest vessel available which can use existing navigation channels. Smaller vessels appear to be selected when larger vessels are not available.

Future Fleet

Two liquid bulk vessel fleet forecast methodologies were assessed.

Port Depth Driven Forecast

The transportation cost analysis is based on this scenario. This approach limited the fleet to the shallower available port drafts, either shipping or receiving. In this case, deepening at Long Beach allows capacity for deeper vessels to call up to the foreign port depth limits.

TBS Forecast

The TBS forecast presented an alternate scenario based on the existing fleet and on replacement of vessels in that fleet when existing vessels reached the end of their economic life and/or when additional vessels were needed to meet throughput projections. Throughput projections were obtained from WEFA results, using the No-ANWR scenario. It was assumed that newer vessels would be constructed to optimum size. The projected vessel fleet for both Ports of Long Beach and Los Angeles is shown on Table E-12 and considers replacement assumptions and channel deepening. In general, it was found that the forecast which limited vessel size solely to operating port draft was comparable to the TBS forecast with a trend in the latter toward more of the deeper draft vessels.

TABLE E-12

TBS PROJECTED VESSEL FLEET, LA/LB HARBORS, 1990 TO 2020
NUMBERS OF VESSELS AND PROJECTED CALLS (NO-ANWR)

Vessel Size	Number in Fleet (calls per year)			
(X 1,000 DWT)	1990	2000	2010	2020
10-40	1 (18)	<1 (13)*	<1 (6)*	0
41-80	2 (53)	3 (50)	3 (47)	3 (44)
81-100	2 (26)	2 (27)	2 (28)	2 (29)
101-150	2 (45)	2 (34)	1 (22)	1 (10)
151-200	3 (66)	3 (50)	2 (34)	2 (17)
201-300	1 (6)	2 (17)	4 (30)	5 (43)
300-400	(2)	1 (7)	2 (12)	3 (17)
Total	**11**	**13**	**14**	**16**

*** Projections from Temple, Barker, and Sloane projection of vessel fleet; <1 = less than one full-time vessel required to make the number of trips indicated.**

As Table E-12 indicates, by 2020 the majority of crude petroleum deliveries to the combined Ports will be made by vessels of greater than 150,000 DWT.

TRANSPORTATION COSTS

Baseline Conditions

The channel available to Berth 121 under baseline conditions has a limiting depth of -60' MLLW.

Without Project Transportation Costs

Port facilities and navigation features available for the without project condition are adequate to handle 265,000 DWT light-loaded vessels which require water depth of about 60 feet. Tankers greater than 100,000 DWT will be available for the Far East, Persian Gulf and Alaska trade routes. The depths available at Berth 121 and the shipping ports will constrain the use of the larger vessels. Foreign ports with the same or similar depths are grouped together and a weighted average is computed for the percentage of cargo constrained by that depth as shown in Table E-10. The limiting depth was determined by which port was shallower, shipping or receiving. It can be seen on the Far East crude trade (Table E-10) that under without project conditions (60' + 3' tide at POLB), 64% of the cargo is constrained by foreign port depths and the remainder is constrained by POLB depth. Once this was determined, a fleet was selected based on the most economical vessel size operating at that limiting depth.

With Project Transportation Costs

The with project transportation cost analysis focused on the cost of transporting projected crude commodities on the Far East, Persian Gulf, and Alaska trade routes, since project benefits are generated from these trade routes. First, transportation costs per round trip for each of the three trade routes are computed for a range of vessels based on trade route distances and 1995 Institute for Water Resources (IWR) vessel costs and characteristics, as shown in Table E-13. The cost per trip information presented in Table E-14 through E-16 is then input into a spreadsheet which computes cost per ton for a range of vessels and a range of light-loading conditions utilizing necessary underkeel clearance, constrained load, and time in port.

The vessel range for the analysis includes crude carriers up to 365,000 DWT. These largest vessels would be utilized only on certain Persian Gulf Trade routes and differ from the 325,000 DWT and 265,000 DWT vessels primarily in design draft only (similar lengths and beams for channel design purposes). The liquid bulk operators, the TBS analysis, and the foreign port operating drafts all indicate the probable use of these larger vessels on the prescribed trade routes. Tables E-17 through E-20 display cost per ton and costs for each of the three rates.

TABLE E-13 INSTITUTE FOR WATER RESOURCES DATA

Table E-13a
FOREIGN FLAG HULLS

DWT (1,000)	DAILY COSTS IN PORT 2000	DAILY COSTS @ SEA 2000	DAILY COSTS IN PORT 2010	DAILY COSTS @ SEA 2010	LENGTH (ft)	BEAM (ft)	DFT(ft)	IM'N FACTOR (tpi)
150	$26,786	$32,185	$29,776	$35,175	927	148	57	274
175	$28,651	$34,488	$32,297	$38,134	969	155	59.7	302
200	$30,419	$36,673	$34,703	$40,957	1007	162	61	329
230	$32,438	$39,170	$37,467	$44,199	1048	170	63	359
265	$34,679	$41,943	$40,550	$47,815	1100	178	68	394
X300	$36,818	$44,592	$43,508	$51,282	1132	185	69	427
325	$38,294	$46,419	$45,555	$53,680	1158	190	72	449
365	$39,731	$48,199	$47,553	$56,021	1178	195	74	484

Table E-13b
U.S. FLAG HULLS

DWT (1,000)	DAILY COSTS IN PORT 2000	DAILY COSTS @ SEA 2000	DAILY COSTS IN PORT 2010	DAILY COSTS @ SEA 2010	LENGTH	BEAM	DFT	IM'N FACTOR
150	$65,466	$70,865	$72,941	$78,340	927	148	57	274
175	$69,482	$75,319	$78,597	$84,434	969	155	58	302
200	$73,263	$79,517	$83,973	$90,227	1007	162	61	329
230	$77,547	$84,279	$90,119	$96,851	1048	170	63	359
265	$82,263	$89,528	$96,942	$104,207	1092	178	66	394

TABLE E-14 TANKER OPERATING COSTS FROM THE PERSIAN GULF

Persian Gulf
11,575 N. MILES

2000 TRANSITION FROM SINGLE TO DOUBLE HULLS

VESSEL CHARACTERISTICS

25-May-95
11:18 AM

DWT (1000)	SPD (kt)	DOUBLE HULLED DRAFT	IMMERS FACTOR (TPF)	SEA	PORT	DAILY VESSEL OPERATING COSTS SEA	PORT	COST PER TRIP AT SEA	PORT
90	14	48.8	2,383	68.9	1.1	25,967	21,734	1,789,072	23,907
120	14	53.2	2,852	68.9	1.2	29,225	24,384	2,013,563	29,261
150	14	57.0	3,284	68.9	1.2	32,185	26,786	2,217,535	32,143
175	14	59.7	3,622	68.9	1.3	34,488	28,651	2,376,157	37,246
200	14	62.2	3,944	68.9	1.3	36,673	30,419	2,526,726	39,545
230	14	64.9	4,313	68.9	1.4	39,170	32,438	2,698,789	45,414
265	14	67.8	4,725	68.9	1.5	41,943	34,679	2,889,830	52,018
300	14	70.4	5,118	68.9	1.6	44,592	36,818	3,072,304	58,909
325	14	72.1	5,390	68.9	1.8	46,419	38,294	3,198,207	68,929
365	14	73.8	5,655	68.9	1.9	48,199	39,731	3,320,867	75,489
~~400~~	~~14~~	~~76.0~~	~~5,166~~	~~68.9~~	~~2.0~~	~~51,638~~	~~42,508~~	~~3,557,808~~	~~85,017~~

340 vessel operating days per year.
Vessels load up to 90%
Vessel Costs current as of March, 1993
Formula for Double Hull Design Draft from Dick Schultz of IWR.
DRAFT = DWT^(.305)*1.503

2010 AND BEYOND, 100% DOUBLE HULLS

VESSEL CHARACTERISTICS

25-May-95
11:18 AM

DWT (1000)	SPD (kt)	DOUBLE HULLED DRAFT	IMMERS FACTOR (TPF)	SEA	PORT	DAILY VESSEL OPERATING COSTS SEA	PORT	COST PER TRIP AT SEA	($) PORT
90	14	48.8	2,383	68.9	1.1	27,296	23,063	1,880,673	25,369
120	14	53.2	2,852	68.9	1.2	31,401	26,560	2,163,504	31,872
150	14	57.0	3,284	68.9	1.2	35,175	29,776	2,423,549	35,731
175	14	59.7	3,622	68.9	1.3	38,134	32,297	2,627,366	41,986
200	14	62.2	3,944	68.9	1.3	40,957	34,703	2,821,898	45,114
230	14	64.9	4,313	68.9	1.4	44,199	37,467	3,045,262	52,454
265	14	67.8	4,725	68.9	1.5	47,815	40,550	3,294,381	60,826
300	14	70.4	5,118	68.9	1.6	51,282	43,508	3,533,243	69,613
325	14	72.1	5,390	68.9	1.8	53,680	45,555	3,698,494	81,999
365	14	73.8	5,655	68.9	1.9	56,021	47,553	3,859,780	90,351

TABLE E-15 TANKER OPERATING COSTS FROM THE FAR EAST

Far East
8,250 N. MILES

2000 TRANSITION FROM SINGLE TO DOUBLE HULLS

VESSEL CHARACTERISTICS

27-Feb-95
02:28 PM

DWT (1000)	SPD (kt)	DOUBLE HULLED DRAFT	IMMERS FACTOR (TPF)	Days @ SEA	Days @ PORT	DAILY VESSEL OPERATING COSTS SEA	PORT	COST PER TRIP AT SEA	PORT
150	14	57.0	3,284	49.1	1.2	32,185	26,786	1,580,533	32,143
175	14	59.7	3,622	49.1	1.3	34,466	28,651	1,693,589	37,246
200	14	62.2	3,944	49.1	1.3	36,673	30,419	1,800,907	39,545
230	14	64.9	4,313	49.1	1.4	39,170	32,438	1,923,543	45,414
265	14	67.8	4,725	49.1	1.5	41,943	34,679	2,059,706	52,018
300	14	70.4	5,118	49.1	1.6	44,592	36,818	2,189,763	58,909
325	14	72.1	5,390	49.1	1.8	46,419	38,294	2,279,499	68,929

340 vessel operating days per year.
Vessels load up to 90%
Vessel Costs current as of December, 1994
Formula for Double Hull Design Draft from IWR.
DRAFT = DWT^(.305)*1.503

2010 AND BEYOND, 100% DOUBLE HULLS

VESSEL CHARACTERISTICS

27-Feb-95
02:28 PM

DWT (1000)	SPD (kt)	DOUBLE HULLED DRAFT	IMMERS FACTOR (TPF)	Days @ SEA	Days @ PORT	DAILY VESSEL OPERATING COSTS SEA	PORT	COST PER TRIP AT SEA	($) PORT
150	14	57.0	3,284	49.1	1.2	35,175	29,775	1,727,367	35,731
175	14	59.7	3,622	49.1	1.3	38,134	32,297	1,872,637	41,986
200	14	62.2	3,944	49.1	1.3	40,957	34,703	2,011,288	45,114
230	14	64.9	4,313	49.1	1.4	44,199	37,467	2,170,489	52,454
265	14	67.8	4,725	49.1	1.5	47,815	40,550	2,348,047	60,826
300	14	70.4	5,118	49.1	1.6	51,282	43,508	2,518,294	69,613
325	14	72.1	5,390	49.1	1.8	53,680	45,555	2,636,075	81,999

TABLE E-16 TANKER OPERATING COSTS FROM ALASKA

Alaska
2,240 N. MILES

2000 TRANSITION FROM SINGLE TO DOUBLE HULLS

VESSEL CHARACTERISTICS

31-Jan-95
02:59 PM

DWT (1000)	SPD (kt)	DES DFT (ft)	IMMERS FACTOR (TPF)	Days@ SEA	Days@ PORT	DAILY VESSEL OPERATING COSTS SEA	DAILY VESSEL OPERATING COSTS PORT	COST PER TRIP AT SEA	COST PER TRIP AT PORT
150	14	57.0	3,284	13.3	1.2	70,865	65,466	944,870	78,559
175	14	59.7	3,622	13.3	1.3	75,319	69,482	1,004,257	90,327
200	14	62.2	3,944	13.3	1.3	79,517	73,263	1,060,222	95,241
230	14	64.9	4,313	13.3	1.4	84,279	77,547	1,123,723	108,566
265	14	67.8	4,725	13.3	1.5	89,528	82,263	1,193,701	123,395

340 vessel operating days per year.
Vessels load up to 90%
Vessel Costs current as of December, 1994
Formula for Double Hull Design Draft from IWR:
Draft = DWT^.305*1.503

2010 AND BEYOND, 100% DOUBLE HULLS

VESSEL CHARACTERISTICS

31-Jan-95
02.59 PM

DWT (1000)	SPD (kt)	DES DFT (ft)	IMMERS FACTOR (TPF)	Days @ SEA	Days @ PORT	DAILY VESSEL OPERATING COSTS SEA	DAILY VESSEL OPERATING COSTS PORT	COST PER TRIP AT ($) SEA	COST PER TRIP AT ($) PORT
150	14	57.0	3,284	13.3	1.2	$78,340	$72,941	1,044,539	87,529
175	14	59.7	3,622	13.3	1.3	$84,434	$78,597	1,125,792	102,177
200	14	62.2	3,944	13.3	1.3	$90,227	$83,973	1,203,026	109,165
230	14	64.9	4,313	13.3	1.4	$96,851	$90,119	1,291,347	126,167
265	14	67.8	4,725	13.3	1.5	$104,207	$96,942	1,389,423	145,414

TABLE E-17 COST PER TON CALCULATIONS - PERSIAN GULF

FORMULA AVAIL. DEPTH (INCL.TIDE)	DWT (1000s)	FULLY LOADED DRAFT	UNDER KEEL CLEAR. (w/o trim)	PORT MAX. OP. DRAFT (w/o trim)	ADJUST OP. DRAFT FOR TRIM	MAX LOAD ADJUSTED FOR TRIM (1,000 MT)	ADD'L LIGHT LOADING REQUIRED	AMIDSHIPS OPERATING DRAFT	CONSTR. LOAD (1,000 MT)	LOAD COST ($/MT) 2000	LOAD COST ($/MT) 2010
WOUT/PROJECT											
63	175	59.7	4.2	58.8	1.8	151.0	0.9	57.0	147.8	16.33	18.06
63	200	62.2	4.4	58.6	1.9	172.6	3.6	56.8	158.6	16.18	18.07
63	230	64.9	4.5	58.5	1.9	198.6	6.4	56.5	170.8	16.07	18.14
63	265	67.8	4.7	58.3	[illegible].0	228.9	9.5	56.2	183.9	15.99	18.24
63	150	57.0	4.0	59.0	1.7	129.4	0.0	55.3	129.4	17.39	19.01
63.5											
64	200	62.2	4.4	59.6	1.9	172.6	2.6	57.8	162.6	15.78	17.63
64	175	59.7	4.2	59.8	1.8	151.0	0.0	57.9	151.0	15.98	17.68
64	230	64.9	4.5	59.5	1.9	198.6	5.4	57.5	175.1	15.67	17.69
64	265	67.8	4.7	59.3	2.0	228.9	8.5	57.2	188.7	15.59	17.78
64	150	57.0	4.0	60.0	1.7	129.4	0.0	55.3	129.4	17.39	19.01
64.5											
65	200	62.2	4.4	60.6	1.9	172.6	1.6	58.8	166.5	15.41	17.22
65	230	64.9	4.5	60.5	1.9	198.6	4.4	58.5	179.4	15.30	17.27
65	265	67.8	4.7	60.3	2.0	228.9	7.5	58.2	193.4	15.21	17.35
65	300	70.4	4.9	60.1	2.1	259.2	10.3	58.0	206.4	15.17	17.45
65	175	59.7	4.2	60.8	1.8	151.0	0.0	57.9	151.0	15.98	17.68
65.5											
66	200	62.2	4.4	61.6	1.9	172.6	0.6	59.8	170.5	15.05	16.82
66	230	64.9	4.5	61.5	1.9	198.6	3.4	59.5	183.7	14.94	16.86
66	265	67.8	4.7	61.3	2.0	228.9	6.5	59.2	198.1	14.85	16.94
66	300	70.4	4.9	61.1	2.1	259.2	9.3	59.0	211.5	14.80	17.03
66	175	59.7	4.2	61.8	1.8	151.0	0.0	57.9	151.0	15.98	17.68
66.5											
67	230	64.9	4.5	62.5	1.9	198.6	2.4	60.5	188.0	14.59	16.47
67	265	67.8	4.7	62.3	2.0	228.9	5.5	60.2	202.8	14.50	16.54
67	200	62.2	4.4	62.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
67	300	70.4	4.9	62.1	2.1	259.2	8.3	60.0	216.7	14.45	16.63
67	175	59.7	4.2	62.8	1.8	151.0	0.0	57.9	151.0	15.98	17.68
67.5											
68	230	64.9	4.5	63.5	1.9	198.6	1.4	61.5	192.3	14.27	16.10
68	265	67.8	4.7	63.3	2.0	228.9	4.5	61.2	207.6	14.17	16.17
68	300	70.4	4.9	63.1	2.1	259.2	7.3	61.0	221.8	14.12	16.25
68	200	62.2	4.4	63.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
68	175	59.7	4.2	63.8	1.8	151.0	0.0	57.9	151.0	15.98	17.68
68.5											
69	230	64.9	4.5	64.5	1.9	198.6	0.4	62.5	196.7	13.95	15.75
69	265	67.8	4.7	64.3	2.0	228.9	3.5	62.2	212.3	13.86	15.81
69	300	70.4	4.9	64.1	2.1	259.2	6.3	62.0	226.9	13.80	15.88
69	325	72.1	5.0	64.0	2.2	280.8	8.2	61.8	236.8	13.80	15.97
69	200	62.2	4.4	64.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
69.5											
70	265	67.8	4.7	65.3	2.0	228.9	2.5	63.2	217.0	13.56	15.46
70	300	70.4	4.9	65.1	2.1	259.2	5.3	63.0	232.0	13.50	15.53
70	230	64.9	4.5	65.5	1.9	198.6	0.0	63.0	198.6	13.82	15.60
70	325	72.1	5.0	65.0	2.2	280.8	7.2	62.8	242.2	13.49	15.61

70	200	62.2	4.4	65.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
70.5											
71	265	67.8	4.7	66.3	2.0	228.9	1.5	64.2	221.7	13.27	15.13
[illegible]	300	70.4	4.9	66.1	2.1	259.2	4.3	64.0	237.1	13.21	15.19
	325	72.1	5.0	66.0	2.2	280.8	6.2	63.8	247.6	13.20	15.27
71	230	64.9	4.5	66.5	1.9	198.6	0.0	63.0	198.6	13.82	15.60
71	200	62.2	4.4	66.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
71.5											
72	265	67.8	4.7	67.3	2.0	228.9	0.5	65.2	226.5	12.99	14.82
72	300	70.4	4.9	67.1	2.1	259.2	3.3	65.0	242.2	12.93	14.87
72	325	72.1	5.0	67.0	2.2	280.8	5.2	64.8	253.0	12.92	14.95
72	230	64.9	4.5	67.5	1.9	198.6	0.0	63.0	198.6	13.82	15.60
72	200	62.2	4.4	67.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
72.5											
73	300	70.4	4.9	68.1	2.1	259.2	2.3	66.0	247.4	12.66	14.57
73	325	72.1	5.0	68.0	2.2	280.8	4.2	65.8	258.3	12.65	14.63
73	265	67.8	4.7	68.3	2.0	228.9	0.0	65.7	228.9	12.85	14.66
73	365	73.8	5.2	67.8	2.2	302.5	6.0	65.6	268.7	12.64	14.70
73	230	64.9	4.5	68.5	1.9	198.6	0.0	63.0	198.6	13.82	15.60
73	200	62.2	4.4	68.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
73.5											
74	300	70.4	4.9	69.1	2.1	259.2	1.3	67.0	252.5	12.40	14.27
74	325	72.1	5.0	69.0	2.2	280.8	3.2	66.8	263.7	12.39	14.33
74	365	73.8	5.2	68.8	2.2	302.5	5.0	66.6	274.4	12.38	14.40
74	265	67.8	4.7	69.3	2.0	228.9	0.0	65.7	228.9	12.85	14.66
74	230	64.9	4.5	69.5	1.9	198.6	0.0	63.0	198.6	13.82	15.60
74	200	62.2	4.4	69.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
74.5											
75	300	70.4	4.9	70.1	2.1	259.2	0.3	68.0	257.6	12.16	13.99
75	325	72.1	5.0	70.0	2.2	280.8	2.2	67.8	269.1	12.14	14.05
[illegible]	365	73.8	5.2	69.8	2.2	302.5	4.0	67.6	280.1	12.13	14.10
75	400	76.8	5.4	69.6	2.3	345.8	7.2	67.3	301.3	12.09	14.19
75	265	67.8	4.7	70.3	2.0	228.9	0.0	65.7	228.9	12.85	14.66
75.5											
76	325	72.1	5.0	71.0	2.2	280.8	1.2	68.8	274.5	11.90	13.77
76	365	73.8	5.2	70.8	2.2	302.5	3.0	68.6	285.7	11.89	13.83
76	300	70.4	4.9	71.1	2.1	259.2	0.0	68.3	259.2	12.08	13.90
76	400	76.8	5.4	70.6	2.3	345.8	6.2	68.3	307.4	11.85	13.90
76	200	62.2	4.4	71.6	1.9	172.6	0.0	60.3	172.6	14.86	16.61
76.5											
77	325	72.1	5.0	72.0	2.2	280.8	0.2	69.8	279.9	11.67	13.51
77	365	73.8	5.2	71.8	2.2	302.5	2.0	69.6	291.4	11.66	13.56
77	400	76.8	5.4	71.6	2.3	345.8	5.2	69.3	313.6	11.62	13.63
77	300	70.4	4.9	72.1	2.1	259.2	0.0	68.3	259.2	12.08	13.90
77	265	67.8	4.7	72.3	2.0	228.9	0.0	65.7	228.9	12.85	14.66
77.5											
78	365	73.8	5.2	72.8	2.2	302.5	1.0	70.6	297.0	11.43	13.30
78	325	72.1	5.0	73.0	2.2	280.8	0.0	70.0	280.8	11.63	13.46
78.5											
79	365	73.8	5.2	73.8	2.2	302.5	0.0	71.6	302.5	11.23	13.06
79	325	72.1	5.0	74.0	2.2	280.8	0.0	70.0	280.8	11.63	13.46
79.5											
80	365	73.8	5.2	74.8	2.2	302.5	0.0	71.6	302.5	11.23	13.06
81	365	73.8	5.2	75.8	2.2	302.5	0.0	71.6	302.5	11.23	13.06
82	365	73.8	5.2	76.8	2.2	302.5	0.0	71.6	302.5	11.23	13.06
[illegible]	365	73.8	5.2	77.8	2.2	302.5	0.0	71.6	302.5	11.23	13.06
	365	73.8	5.2	78.8	2.2	302.5	0.0	71.6	302.5	11.23	13.06

TABLE E-18 COST PER TON CALCULATIONS - FAR EAST

03-Feb-95 Transportation Costs for Far East Crude
03:40 PM Fleet restricted to Maximum of 325,000 DWT

COSTS PER TON - Far East
DIST = 8,250 Nautical Miles One Way

A	B	C	D	E	F	G	H	I	J	L	M
FORMULA			.07*C	A-D	.03*C	.9*DWT-IR*F	C-E	C-F-H	G-IR*H		
AVAIL. DEPTH (INCL.TIDE)	DWT (1000s)	FULLY LOADED DRAFT	UNDER KEEL CLEAR. (w/o trim)	PORT MAX. OP. DRAFT (w/o trim)	ADJUST OP. DRAFT FOR TRIM	MAX LOAD ADJUSTED FOR TRIM (1,000 MT)	ADD'L LIGHT LOADING REQUIRED	AMIDSHIPS OPERATING DRAFT	CONSTR. LOAD (1,000 MT)	LOAD COST ($/MT) 2000	LOAD COST ($/MT) 2010
WOUT/PROJECT											
59	150	57.0	4.0	55.0	1.7	129.4	2.0	53.3	122.9	13.12	14.34
59	175	59.7	4.2	54.8	1.8	151.0	4.9	53.0	133.3	12.99	14.37
59	200	62.2	4.4	54.6	1.9	172.6	7.6	52.8	142.9	12 88	14.39
59	230	64.9	4.5	54.5	1.9	198.6	10.4	52.5	153.5	12.82	14.48
59	120	53.2	3.7	55.3	1.6	103.4	0.0	51.6	103.4	14.16	15.21
59	90	48.8	3.4	55.6	1.5	77.5	0.0	47.3	77.5	16.76	17.62
59.5											
63	175	59.7	4.2	58.8	1.8	151.0	0.9	57.0	147.8	11.71	12.96
63	200	62.2	4.4	58.6	1.9	172.6	3.6	56.8	158.6	11.60	12.96
63	230	64.9	4.5	58.5	1.9	198.6	6.4	56.5	170.8	11.53	13.02
63	265	67.8	4.7	58.3	2.0	228.9	9.5	56.2	183.9	11.48	13.10
63	300	70.4	4.9	58.1	2.1	259.2	12.3	56.0	196.2	11.46	13.19
63.5											
64	200	62.2	4.4	59.6	1.9	172.6	2.6	57.8	162.6	11.32	12.65
64	175	59.7	4.2	59.8	1.8	151.0	0.0	57.9	151.0	11.46	12.68
64	230	64.9	4.5	59.5	1.9	198.6	5.4	57.5	175.1	11.25	12.70
64	265	67.8	4.7	59.3	2.0	228.9	8.5	57.2	188.7	11.19	12.77
64	150	57.0	4.0	60.0	1.7	129.4	0.0	55.3	129.4	12.46	13.63
64.5											
65	200	62.2	4.4	60.6	1.9	172.6	1.6	58.8	166.5	11.05	12.35
65	230	64.9	4.5	60.5	1.9	198.6	4.4	58.5	179.4	10.97	12.39
65	265	67.8	4.7	60.3	2.0	228.9	7.5	58.2	193.4	10.92	12.46
65	300	70.4	4.9	60.1	2.1	259.2	10.3	58.0	206.4	10.89	12.54
65	175	59.7	4.2	60.8	1.8	151.0	0:0	57.9	151.0	11.46	12.68
65.5											
66	200	62.2	4.4	61.6	1.9	172.6	0.6	59.8	170.5	10.80	12.06
66	230	64.9	4.5	61.5	1.9	198.6	3.4	59.5	183.7	10.72	12.10
66	265	67.8	4.7	61.3	2.0	228.9	6.5	59.2	198.1	10.66	12.16
66	300	70.4	4.9	61.1	2.1	259.2	9.3	59.0	211.5	10.63	12.23
66	175	59.7	4.2	61.8	1.8	151.0	0.0	57.9	151.0	11.46	12.68
66.5											
67	230	64.9	4.5	62.5	1.9	198.6	2.4	60.5	188.0	10.47	11.82
67	265	67.8	4.7	62.3	2.0	228.9	5.5	60.2	202.8	10.41	11.88
67	200	62.2	4.4	62.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
67	300	70.4	4.9	62.1	2.1	259.2	8.3	60.0	216.7	10.38	11.95
67	175	59.7	4.2	62.8	1.8	151.0	0.0	57.9	151.0	11.46	12.68
67.5											
68	230	64.9	4.5	63.5	1.9	198.6	1.4	61.5	192.3	10.24	11.56
68	265	67.8	4.7	63.3	2.0	228.9	4.5	61.2	207.6	10.17	11.61
68	300	70.4	4.9	63.1	2.1	259.2	7.3	61.0	221.8	10.14	11.67
68	200	62.2	4.4	63.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
68	175	59.7	4.2	63.8	1.8	151.0	0.0	57.9	151.0	11.46	12.68
68.5											
69	230	64.9	4.5	64.5	1.9	198.6	0.4	62.5	196.7	10.01	11.30
69	265	67.8	4.7	64.3	2.0	228.9	3.5	62.2	212.3	9.95	11.35
69	300	70.4	[illegible]	64.1	[illegible]	259.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

69	325	72.1	5.0	64.0	2.2	280.8	8.2	61.8	236.8	9.92	11.48
69	200	62.2	4.4	64.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
69.5											
70	265	67.8	4.7	65.3	2.0	228.9	2.5	63.2	217.0	9.73	11.10
70	300	70.4	4.9	65.1	2.1	259.2	5.3	63.0	232.0	9.69	11.15
70	230	64.9	4.5	65.5	1.9	198.6	0.0	63.0	198.6	9.91	11.19
70	325	72.1	5.0	65.0	2.2	280.8	7.2	62.8	242.2	9.70	11.22
70	200	62.2	4.4	65.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
70.5											
71	265	67.8	4.7	66.3	2.0	228.9	1.5	64.2	221.7	9.52	10.86
71	300	70.4	4.9	66.1	2.1	259.2	4.3	64.0	237.1	9.48	10.91
71	325	72.1	5.0	66.0	2.2	280.8	6.2	63.8	247.6	9.49	10.98
71	230	64.9	4.5	66.5	1.9	198.6	0.0	63.0	198.6	9.91	11.19
71	200	62.2	4.4	66.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
71.5											
72	265	67.8	4.7	67.3	2.0	228.9	0.5	65.2	226.5	9.33	10.64
72	300	70.4	4.9	67.1	2.1	259.2	3.3	65.0	242.2	9.28	10.68
72	325	72.1	5.0	67.0	2.2	280.8	5.2	64.8	253.0	9.28	10.75
72	230	64.9	4.5	67.5	1.9	198.6	0.0	63.0	198.6	9.91	11.19
72	200	62.2	4.4	67.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
72.5											
73	300	70.4	4.9	68.1	2.1	259.2	2.3	66.0	247.4	9.09	10.46
73	325	72.1	5.0	68.0	2.2	280.8	4.2	65.8	258.3	9.09	10.52
73	265	67.8	4.7	68.3	2.0	228.9	0.0	65.7	228.9	9.23	10.52
73	365	74.7	5.2	67.8	2.2	315.5	7.0	65.5	275.1	9.07	10.58
73	230	64.9	4.5	68.5	1.9	198.6	0.0	63.0	198.6	9.91	11.19
73.5											
74	300	70.4	4.9	69.1	2.1	259.2	1.3	67.0	252.5	8.91	10.25
74	325	72.1	5.0	69.0	2.2	280.8	3.2	66.8	263.7	8.90	10.31
74	265	67.8	4.7	69.3	2.0	228.9	0.0	65.7	228.9	9.23	10.52
74	265	67.8	4.7	69.3	2.0	228.9	0.0	65.7	228.9	9.23	10.52
74	230	64.9	4.5	69.5	1.9	198.6	0.0	63.0	198.6	9.91	11.19
74.5											
75	300	70.4	4.9	70.1	2.1	259.2	0.3	68.0	257.6	8.73	10.05
75	325	72.1	5.0	70.0	2.2	280.8	2.2	67.8	269.1	8.73	10.10
75	325	72.1	5.0	70.0	2.2	280.8	2.2	67.8	269.1	8.73	10.10
75	230	64.9	4.5	70.5	1.9	198.6	0.0	63.0	198.6	9.91	11.19
75	265	67.8	4.7	70.3	2.0	228.9	0.0	65.7	228.9	9.23	10.52
75.5											
76	325	72.1	5.0	71.0	2.2	280.8	1.2	68.8	274.5	8.55	9.90
76	325	72.1	5.0	71.0	2.2	280.8	1.2	68.8	274.5	8.55	9.90
76	300	70.4	4.9	71.1	2.1	259.2	0.0	68.3	259.2	8.68	9.98
76	325	72.1	5.0	71.0	2.2	280.8	1.2	68.8	274.5	8.55	9.90
76	200	62.2	4.4	71.6	1.9	172.6	0.0	60.3	172.6	10.66	11.91
76.5											
77	325	72.1	5.0	72.0	2.2	280.8	0.2	69.8	279.9	8.39	9.71
78	325	72.1	5.0	73.0	2.2	280.8	0.0	70.0	280.8	8.36	9.68
79	325	72.1	5.0	74.0	2.2	280.8	0.0	70.0	280.8	8.36	9.68
80	325	72.1	5.0	75.0	2.2	280.8	0.0	70.0	280.8	8.36	9.68
81	325	72.1	5.0	76.0	2.2	280.8	0.0	70.0	280.8	8.36	9.68

TABLE E-19 COST PER TON CALCULATIONS - ALASKA

31-Jan-95
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COSTS PER TON - Alaska
DIST = 2,240 Nautical Miles One Way

A	B	C	D	E	F	G	H	I	J	L	M
FORMULA			.07*C	A-D	.03*C	.9*DWT-IR*F	C-E	C-F-H	G-IR*H		
AVAIL. DEPTH (INCL.TIDE)	DWT (1000s)	FULLY LOADED DRAFT	UNDER KEEL CLEAR. (w/o trim)	PORT MAX. OP. DRAFT (w/o trim)	ADJUST OP. DRAFT FOR TRIM	MAX LOAD ADJUSTED FOR TRIM (1,000 MT)	ADD'L LIGHT LOADING REQUIRED	AMIDSHIPS OPERATING DRAFT	CONSTR. LOAD (1,000 MT)	LOAD COST ($/MT) 2000	LOAD COST ($/MT) 2010
WOUT/PROJECT											
63	200	62.2	4.4	58.6	1.5	172.6	3.6	56.8	158.6	7.28	8.27
63	230	64.9	4.5	58.5	1.9	198.6	6.4	56.5	170.8	7.22	8.30
63	175	59.7	4.2	58.8	1.8	151.0	0.9	57.0	147.8	7.41	8.31
63	265	67.8	4.7	58.3	2.0	228.9	9.5	56.2	183.9	7.16	8.34
63	150	57.0	4.0	59.0	1.7	129.4	0.0	55.3	129.4	7.91	8.75
63.5											
64	200	62.2	4.4	59.6	1.9	172.6	2.6	57.8	162.6	7.11	8.07
64	230	64.9	4.5	59.5	1.9	198.6	5.4	57.5	175.1	7.04	8.10
64	175	59.7	4.2	59.8	1.8	151.0	0.0	57.9	151.0	7.25	8.13
64	265	67.8	4.7	59.3	2.0	228.9	8.5	57.2	188.7	6.98	8.14
64	150	57.0	4.0	60.0	1.7	129.4	0.0	55.3	129.4	7.91	8.75
64.5											
65	200	62.2	4.4	60.6	1.9	172.6	1.6	58.8	166.5	6.94	7.88
65	230	64.9	4.5	60.5	1.9	198.6	4.4	58.5	179.4	6.87	7.90
65	265	67.8	4.7	60.3	2.0	228.9	7.5	58.2	193.4	6.81	7.94
65	175	59.7	4.2	60.8	1.8	151.0	0.0	57.9	151.0	7.25	8.13
65.5											
66	200	62.2	4.4	61.6	1.9	172.6	0.6	59.8	170.5	6.78	7.70
66	230	64.9	4.5	61.5	1.9	198.6	3.4	59.5	183.7	6.71	7.72
66	265	67.8	4.7	61.3	2.0	228.9	6.5	59.2	198.1	6.65	7.75
66	175	59.7	4.2	61.8	1.8	151.0	0.0	57.9	151.0	7.25	8.13
66.5											
67	230	64.9	4.5	62.5	1.9	198.6	2.4	60.5	188.0	6.55	7.54
67	265	67.8	4.7	62.3	2.0	228.9	5.5	60.2	202.8	6.49	7.57
67	200	62.2	4.4	62.6	1.9	172.6	0.0	60.3	172.6	6.69	7.60
67	175	59.7	4.2	62.8	1.8	151.0	0.0	57.9	151.0	7.25	8.13
67.5											
68	230	64.9	4.5	63.5	1.9	198.6	1.4	61.5	192.3	6.41	7.37
68	265	67.8	4.7	63.3	2.0	228.9	4.5	61.2	207.6	6.35	7.39
68	200	62.2	4.4	63.6	1.9	172.6	0.0	60.3	172.6	6.69	7.60
68	175	59.7	4.2	63.8	1.8	151.0	0.0	57.9	151.0	7.25	8.13
68.5											
69	230	64.9	4.5	64.5	1.9	198.6	0.4	62.5	196.7	6.27	7.21
69	265	67.8	4.7	64.3	2.0	228.9	3.5	62.2	212.3	6.20	7.23
69	200	62.2	4.4	64.6	1.9	172.6	0.0	60.3	172.6	6.69	7.60
69.5											
70	265	67.8	4.7	65.3	2.0	228.9	2.5	63.2	217.0	6.07	7.07
70	230	64.9	4.5	65.5	1.9	198.6	0.0	63.0	198.6	6.20	7.14
70	200	62.2	4.4	65.6	1.9	172.6	0.0	60.3	172.6	6.69	7.60
70.5											
71	265	67.8	4.7	66.3	2.0	228.9	1.5	64.2	221.7	5.94	6.92
72	265	67.8	4.7	67.3	2.0	228.9	0.5	65.2	226.5	5.82	6.78
73	265	67.8	4.7	68.3	2.0	228.9	0.0	65.7	228.9	5.75	6.71
74	265	67.8	4.7	69.3	2.0	228.9	0.0	65.7	228.9	5.75	6.71
75	265	67.8	4.7	70.3	2.0	228.9	0.0	65.7	228.9	5.75	6.71
76	265	67.8	4.7	71.3	2.0	228.9	0.0	65.7	228.9	5.75	6.71

Foreign Port Constraints

The constraining depths at foreign ports and the percentage of the cargo expected to be constrained at each depth is shown in Table E-20.

Cost by Port depth

For each of the three trade routes, foreign port constraints are compared to POLB constraints based on port depth plus whatever usable tide is available at that port. Foreign ports information is available from the "Lloyd's Ports of the World". The cargo and percentages for each draft constraint are then input to a spreadsheet which has the vessel cost and operating characteristics. The assumptions and model methodology used are discussed below. The analysis is based on the following.

a. The Port of Long Beach will continue to receive 80 percent of the volume of crude going through the San Pedro Ports. This factor is applied to all trade routes although only 76% of this volume will benefit from deepening the channel to Berth 121. The remaining 4% of the cargo is shipped in smaller vessels.

b. All large crude carriers on these trade routes will call on Berth 121, based on the deeper water depths available at that berth.

c. If the vessel design draft is greater than the available depth, the vessel will use as much tide as it needs, up to 3 feet, to carry the largest possible load. The amount of time required for safe harbor transit and berthing operations precludes the use of tides above 3 feet because of their short duration.

d. The larger vessels available to call on the Port of Long Beach are limited by available draft and amount of cargo associated with a particular trade route. For the Alaska trade, the maximum vessel used is 265,000 DWT. For the Far East trade, it is 325,000 DWT, and for the Persian Gulf trade, it is 365,000 DWT.

e. Vessels used on the Far East and Persian Gulf trade routes are expected to be foreign fleet. Vessels on the Alaska trade route are U.S. fleet.

f. The specific fleet and vessel operating costs used in the analysis are based on the Water Resources Support Center (WRSC) data provided in December, 1994. The fleet is considered consistent with the projections by TBS forecast, and reflects the maximum vessel sizes expected to be used on these trade routes based on discussions with the various carriers.

TABLE E-20 HISTORICAL SHIPMENTS - BY PORT MAXIMUM DRAFT

MAJOR PERSIAN GULF CRUDE EXPORTING PORTS

MAX O DRAFT (ft)	PORT NAME, COUNTRY	TOTAL IMPORT 1988-1991	SPLIT BY PORT	SPLIT B NATION	PERCENT OF LA/LB	MAXIMUM OPERATING DRAFT (ft)	% OF LA CARGO CONSTRAINED	DRAFT CONSTRAINT GROUPINGS (APPROXIMATE WEIGHTED AVERAGES)
	SAUDI ARABIA			40.0%		103	3.4%	
69	RAS TANURA	14105810	66.7%		26.7%	100	3.0%	
103	JUAYMAH	1786621	8.5%		3.4%	98	2.5%	
	OTHER SAUDI	5240990	24.8%		9.9%	95	2.5%	25% - 90 OR DEEPER
	TOTAL	21133421				92	7.0%	
	SPLIT OTHER BETWEEN					89	8.0%	
98	JUBAIL		6.2%		2.5%	88	3.0%	15% - 86' TO 90'
95	KING FAHD		6.2%		2.5%	85	7.5%	
66	RAS AL KHAFJI		6.2%		2.5%	79	3.0%	10% - 75' TO 86'
69	RAS TANURA		6.2%		2.5%	78	7.0%	
						76	3.0%	
	IRAN			14.0%		71	8.0%	40% - 65' TO 75'
92	KHARG ISL.		50.0%		7.0%	70	3.0%	
78	SIRRI ISL.		50.0%		7.0%	65	26.7%	
						69	2.5%	
	IRAQ			16.0%		66	2.5%	10% - 61 TO 69
71	KHOR AL AMAYA		50.0%		8.0%	55	7.5%	
89	MINA AL BAKR		50.0%		8.0%			
	KUWAIT			15.0%				
85	MINA AL AHMADI		50.0%		7.5%			
55	MINA SAUD		50.0%		7.5%			
	U. ARAB EMIRATES			15.0%				
70	ABU AL BUKHOOSH		20.0%		3.0%			
79	DAS ISLAND		20.0%		3.0%			
100	FATEH TERMINAL		20.0%		3.0%			
76	MUBAREK ISL.		20.0%		3.0%			
88	ZIRKU ISLAND		20.0%		3.0%			

(*) = CARGO IMPORTED FROM PERSIAN GULF TO MAJOR GULF COAST AND EAST COAST PORTS

FAR EAST CRUDE IMPORTS TO LA/LB 1988-1991

PORT NAME, COUNTRY	AVG ANN WT	PCT OF TOTAL	MAXIMUM OPERATING DRAFT (ft)	% OF LB CARGO CONSTRAINED	DRAFT CONSTRAINT GROUPINGS (APPROXIMATE WEIGHTED AVERAGES)
DUMAL MOLUCCA	544,962,765	32.7%	131.2	2.9%	
OTHER MALAYSIA	215,245,105		114.8	2.9%	
LABUAN-SBM		4.3%	91.8	2.9%	
MIRI		4.3%	85.3	2.9%	12% DEEPER THAN 75
BINTULU		4.3%	75.1	4.5%	
OTHER INDONESIA	190,705,540		74.1	4.3%	13% - 70' TO 75'
ARJUNA		2.9%	72.2	3.9%	
BIMA		2.9%	69.9	3.4%	
LAWE-LAWE		2.9%	66.9	4.1%	7% 60' TO 70'
SANTAN		2.9%	57.1	2.7%	
OTHER SUMATRA	135,641,969		57.1	32.7%	
MIRI		4.1%	55.8	4.3%	
KERTEH		4.1%	55.8	4.1%	45% 55' TO 60'
BANGKOK, THAILA	119,029,458	7.1%	52.5	4.3%	
OTHER PHILIPPINE	112,434,000		50.2	4.2%	
LIMAY		3.4%	49.2	2.5%	
MARIVELES		3.4%	37.1	3.4%	
SINGAPORE, SINGA	74,949,251	4.5%	32.8	3.3%	
SRIRACHA, THAIL	69,285,831	4.2%	26.2	7.1%	24.7% TO OTHER BERTHS
HUANGDAO, N. CH	65,508,430	3.9%			
DJAKARTA, SULA	54,893,047	3.3%			
SERIA, BRUNEI	44,923,800	2.7%			
SENIPAH, INDONES	41,508,350	2.5%			

The methodology used to compute with project transportation costs shown on Tables E-21 through E-23 is as follows.

1. The vessel daily operating costs and other IWR data are used to compute the total cost per round trip for the various vessels sizes and trade routes.

2. This cost is divided by the constrained load to compute costs per ton for the range of vessels and a range of light-loading conditions. Channel depths and vessel constrained load limits are based on the vessels requiring water depths 7% greater than the design or loaded draft, and a volume constraint of 90 percent of the DWT vessel capacity. In addition, the vessel is light-loaded by 3% to allow for trim.

3. The constraining depths at foreign ports and the percentage of the cargo expected to be constrained at each depths is as shown in Tables E-21 and 22. Alaska (domestic) is shown in Table E-23.

4. For each of the three trade routes, foreign port constraints are compared to POLB constraints based on port depth plus whatever usable tide is available at that port. For foreign ports, this information is readily available from the "Lloyd's Ports of the World". For POLB, up to 3 feet of usable tide is available if needed. Maximum operating draft is then computed by subtracting underkeel clearance of 7% of this usable depth (including tide). For each alternative depth at POLB, including the without project condition, it is determined whether the depth constraint is at POLB or the foreign port by comparing maximum operating drafts, and the most efficient vessel operating within that constraint is utilized for that percentage of the cargo under that constraint. For example (see Table E-21), for Persian Gulf crude trade and POLB 63' available depth (60'+ 3' tide), the first 10% of the cargo is going to ports that are restricted by a 61' maximum operating draft, therefore the constraint is at the foreign port, and a 200,000 DWT vessel may be used at a cost of $16.30 per ton in the year 2000. The remaining 90% of the cargo is going to ports that have deeper maximum operating drafts, and thus the constraint is at POLB. It can be seen that as the channel alternatives get deeper at POLB, significant reductions in cost are achieved for that portion of the cargo going to deeper foreign ports. For computing total transportation costs by trade route for each depth, the tonnage is simply multiplied by the corresponding cost per ton at that depth for each constraint category (vessel size) and the total is calculated.

5. These costs are then summarized in Table E-24 which gives (for each trade route) transportation costs by POLB channel depth (including without project condition) and decade.

TABLE E-21 TRANSPORTATION COSTS FROM THE PERSIAN GULF

USABLE		Persian Gulf, WEFA Projection									
DEPTH	MAX. OP.				PCT. OF			1,000 METRIC TONS			
(INC.TIDE)	DRAFT				CAR	2000	2010	2020	2030	2040	2050
66	61				10%	320	580	720	740	800	800
74	69				40%	1,280	2,320	2,880	2,960	3,200	3,200
81	75				10%	320	580	720	740	800	800
92	86				15%	480	870	1,080	1,110	1,200	1,200
97	90 AND GREATER				25%	800	1,450	1,800	1,850	2,000	2,000
		TOTAL			100%	3,200	5,800	7,200	7,400	8,000	8,000
W/OUT PROJ - 63'=60'+3 tide			COST	COST							
DEPTH	63		PER TON	PER TON				CONSTRAINED CARGO COST			
(INC.TIDE)	DRAFT	VESSEL	2000	2010		2000	2010	2020	2030	2040	2050
63	59	175	$16.33	$18.06	10%	5,226	10,477	13,006	13,368	14,451	14,451
63	59	175	$16.33	$18.06	40%	20,905	41,909	52,025	53,471	57,806	57,806
63	59	175	$16.33	$18.06	10%	5,226	10,477	13,006	13,368	14,451	14,451
63	59	175	$16.33	$18.06	15%	7,839	15,716	19,510	20,051	21,677	21,677
63	59	175	$16.33	$18.06	25%	13,066	26,193	32,516	33,419	36,129	36,129
					100%	52,263	104,773	130,063	133,676	144,515	144,515
				COST							
W/PROJ =	67 (64 + 3 FT TIDE)			PER TON							
DEPTH	DRAFT	VESSEL	PER TON	2010		2000	2010	2020	2030	2040	2050
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
67	62	230	$14.59	$16.47	40%	18,680	38,220	47,446	48,764	52,717	52,717
67	62	230	$14.59	$16.47	10%	4,670	9,555	11,861	12,191	13,179	13,179
67	62	230	$14.59	$16.47	15%	7,005	14,333	17,792	18,286	19,769	19,769
67	62	230	$14.59	$16.47	25%	11,675	23,888	29,653	30,477	32,948	32,948
					100%	46,848	95,750	118,862	122,164	132,069	132,069
W/PROJ =	68 (65 + 3 FT TIDE)			PER TON							
DEPTH	DRAFT	VESSEL	PER TON	2010		2000	2010	2020	2030	2040	2050
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
68	63	230	$14.27	$16.10	40%	18,262	37,363	46,382	47,670	51,535	51,535
68	63	230	$14.27	$16.10	10%	4,565	9,341	11,595	11,917	12,884	12,884
68	63	230	$14.27	$16.10	15%	6,848	14,011	17,393	17,876	19,326	19,326
68	63	230	$14.27	$16.10	25%	11,413	23,352	28,989	29,794	32,209	32,209
					100%	45,906	93,821	116,468	119,703	129,409	129,409
W/PROJ =	69 (66 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
69	64	230	$13.95	$15.75	40%	17,861	36,543	45,364	46,624	50,405	50,405
69	64	230	$13.95	$15.75	10%	4,465	9,136	11,341	11,656	12,601	12,601
69	64	230	$13.95	$15.75	15%	6,698	13,704	17,012	17,484	18,902	18,902
69	64	230	$13.95	$15.75	25%	11,163	22,840	28,353	29,140	31,503	31,503
					100%	45,005	91,978	114,179	117,351	126,866	126,866
W/PROJ =	70 (67 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
70	65	265	$13.56	$15.46	40%	17,352	35,870	44,528	45,765	49,476	49,476
70	65	265	$13.56	$15.46	10%	4,338	8,968	11,132	11,441	12,369	12,369
70	65	265	$13.56	$15.46	15%	6,507	13,451	16,698	17,162	18,553	18,553

70	65	265	$13.56	$15.46	25%	10,845	22,419	27,830	28,603	30,922	30,922
					100%	43,860	90,462	112,298	115,418	124,776	124,776
W/PROJ =	71 (68 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
71	66	265	$13.27	$15.13	40%	16,982	35,106	43,580	44,790	48,422	48,422
71	66	265	$13.27	$15.13	10%	4,246	8,776	10,895	11,198	12,105	12,105
71	66	265	$13.27	$15.13	15%	6,368	13,165	16,342	16,796	18,158	18,158
71	66	265	$13.27	$15.13	25%	10,614	21,941	27,237	27,994	30,264	30,264
					100%	43,028	88,743	110,163	113,223	122,404	122,404
W/PROJ =	72 (69 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
72	67	265	$12.99	$14.82	40%	16,628	34,373	42,670	43,856	47,411	47,411
72	67	265	$12.99	$14.82	10%	4,157	8,593	10,668	10,964	11,853	11,853
72	67	265	$12.99	$14.82	15%	6,236	12,890	16,001	16,446	17,779	17,779
72	67	265	$12.99	$14.82	25%	10,393	21,483	26,669	27,410	29,632	29,632
					100%	42,231	87,095	108,118	111,121	120,131	120,131
W/PROJ =	73 (70 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
73	68	300	$12.66	$14.57	40%	16,203	33,791	41,948	43,113	46,609	46,609
73	68	300	$12.66	$14.57	10%	4,051	8,448	10,487	10,778	11,652	11,652
73	68	300	$12.66	$14.57	15%	6,076	12,672	15,730	16,167	17,478	17,478
73	68	300	$12.66	$14.57	25%	10,127	21,120	26,217	26,946	29,131	29,131
					100%	41,274	85,786	106,492	109,451	118,325	118,325
W/PROJ =	74 (71 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
74	69	300	$12.40	$14.27	10%	3,969	8,277	10,274	10,560	11,416	11,416
74	69	300	$12.40	$14.27	15%	5,953	12,415	15,412	15,840	17,124	17,124
74	69	300	$12.40	$14.27	25%	9,922	20,692	25,686	26,400	28,540	28,540
					100%	40,535	84,244	104,579	107,484	116,199	116,199
W/PROJ =	75 (72 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
75	70	300	$12.16	$13.99	10%	3,890	8,112	10,070	10,350	11,189	11,189
75	70	300	$12.16	$13.99	15%	5,835	12,168	15,105	15,525	16,784	16,784
75	70	300	$12.16	$13.99	25%	9,724	20,280	25,176	25,875	27,973	27,973
					100%	40,141	83,422	103,558	106,435	115,065	115,065
W/PROJ =	76 (73 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
76	71	325	$11.90	$13.77	10%	3,808	7,988	9,916	10,191	11,017	11,017
76	71	325	$11.90	$13.77	15%	5,713	11,981	14,873	15,286	16,526	16,526
76	71	325	$11.90	$13.77	25%	9,521	19,969	24,789	25,477	27,543	27,543
					100%	39,734	82,799	102,785	105,640	114,205	114,205
W/PROJ =	77 (74 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								

66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
77	72	325	$11.67	$13.51	10%	3,735	7,834	9,725	9,995	10,805	10,805
77	72	325	$11.67	$13.51	15%	5,603	11,751	14,587	14,992	16,208	16,208
77	72	325	$11.67	$13.51	25%	9,338	19,584	24,312	24,987	27,013	27,013
					100%	39,368	82,030	101,830	104,659	113,145	113,145
W/PROJ =	78 (75 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,6[illegible]
78	73	365	$11.43	$13.30	10%	3,659	7,714	9,575	9,841	10,639	10,639
78	73	365	$11.43	$13.30	15%	5,489	11,570	14,363	14,762	15,959	15,959
78	73	365	$11.43	$13.30	25%	9,148	19,284	23,939	24,604	26,599	26,599
					100%	38,988	81,429	101,084	103,892	112,316	112,316
W/PROJ =	79 (76 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
79	73	365	$11.23	$13.06	10%	3,593	7,574	9,403	9,664	10,447	10,447
79	73	365	$11.23	$13.06	15%	5,390	11,361	14,104	14,496	15,671	15,671
79	73	365	$11.23	$13.06	25%	8,983	18,936	23,506	24,159	26,118	26,118
					100%	38,657	80,733	100,220	103,004	111,355	111,355
W/PROJ =	80 (77 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
80	74	365	$11.23	$13.06	10%	3,593	7,574	9,403	9,664	10,447	10,447
80	74	365	$11.23	$13.06	15%	5,390	11,361	14,104	14,496	15,671	15,671
80	74	365	$11.23	$13.06	25%	8,983	18,936	23,506	24,159	26,118	26,118
					100%	38,657	80,733	100,220	103,004	111,355	111,355
W/PROJ =	81 (78 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
66	61	200	$15.05	$16.82	10%	4,817	9,755	12,109	12,446	13,455	13,455
74	69	300	$12.40	$14.27	40%	15,875	33,106	41,098	42,239	45,664	45,664
81	75	365	$11.23	$13.06	10%	3,593	7,574	9,403	9,664	10,447	10,447
81	75	365	$11.23	$13.06	15%	5,390	11,361	14,104	14,496	15,671	15,671
81	75	365	$11.23	$13.06	25%	8,983	18,936	23,506	24,159	26,118	26,118
					100%	38,657	80,733	100,220	103,004	111,355	111,355

TABLE E-22 TRANSPORTATION COSTS FROM THE FAR EAST

USABLE	Far East, WEFA Projection										
DEPTH	MAX. OP.				PCT. OF	1,000 METRIC TONS					
(INC. TIDE)	DRAFT				CAR	2000	2010	2020	2030	2040	2050
59	55				24%	487	421	522	522	442	442
65	60				44%	888	769	953	953	806	806
75	70				7%	142	123	152	152	129	129
81	75				13%	264	228	283	283	239	239
90	84 AND GREATER				12%	243	211	261	261	221	221
	TOTAL				100%	2,028	1,756	2,176	2,176	1,840	1,840
						Note: 24% of projected Far East cargo is					
W/OUT PROJ - 63' (inc3'tide)			COST	COST		foreign port constrained and generates no benefits					
DEPTH	63		PER TON	PER TON		CONSTRAINED CARGO COST					
(INC TIDE)	DRAFT	VESSEL	2000	2010		2000	2010	2020	2030	2040	2050
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
63	59	175	$11.71	$12.96	44%	10,404	9,965	12,349	12,349	10,442	10,442
63	59	175	$11.71	$12.96	7%	1,663	1,593	1,974	1,974	1,669	1,669
63	59	175	$11.71	$12.96	13%	3,088	2,958	3,665	3,665	3,099	3,099
63	59	175	$11.71	$12.96	12%	2,851	2,730	3,383	3,383	2,861	2,861
					100%	24,390	23,290	28,860	28,860	24,404	24,404
				COST							
W/PROJ =	67 (64 + 3 FT TIDE)			PER TON							
DEPTH	DRAFT	VESSEL	PER TON	2010		2000	2010	2020	2030	2040	2050
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
67	62	230	$10.47	$11.82	7%	1,486	1,453	1,801	1,801	1,523	1,523
67	62	230	$10.47	$11.82	13%	2,761	2,699	3,344	3,344	2,828	2,828
67	62	230	$10.47	$11.82	12%	2,548	2,491	3,087	3,087	2,610	2,610
					100%	22,997	22,185	27,491	27,491	23,246	23,246
W/PROJ =	68 (65 + 3 FT TIDE)			PER TON							
DEPTH	DRAFT	VESSEL	PER TON	2010		2000	2010	2020	2030	2040	2050
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
68	63	230	$10.24	$11.56	7%	1,453	1,421	1,760	1,760	1,489	1,489
68	63	230	$10.24	$11.56	13%	2,699	2,638	3,269	3,269	2,764	2,764
68	63	230	$10.24	$11.56	12%	2,491	2,435	3,018	3,018	2,552	2,552
					100%	22,845	22,036	27,306	27,306	23,090	23,090
W/PROJ =	69 (66 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
69	64	230	$10.01	$11.30	7%	1,421	1,389	1,722	1,722	1,456	1,456
69	64	230	$10.01	$11.30	13%	2,640	2,580	3,198	3,198	2,704	2,704
69	64	230	$10.01	$11.30	12%	2,436	2,382	2,952	2,952	2,496	2,496
					100%	22,699	21,893	27,130	27,130	22,940	22,940
W/PROJ =	70 (67 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
70	65	265	$9.73	$11.10	7%	1,381	1,364	1,691	1,691	1,430	1,430
70	65	265	$9.73	$11.10	13%	2,566	2,534	3,140	3,140	2,655	2,655
70	65	265	$9.73	$11.10	12%	2,368	2,339	2,899	2,899	2,451	2,451
					100%	22,517	21,779	26,988	26,988	22,821	22,821
W/PROJ =	71 (68 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
71	66	265	$9.52	$10.86	7%	1,352	1,335	1,655	1,655	1,399	1,399
71	66	265	$9.52	$10.86	13%	2,511	2,480	3,073	3,073	2,599	2,599
71	66	265	$9.52	$10.86	12%	2,318	2,289	2,837	2,837	2,399	2,399
					10[illegible]						

39-785 97 - 18

W/PROJ =	72 (69 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
72	67	265	$9.33	$10.64	7%	1,324	1,308	1,620	1,620	1,370	1,370
72	67	265	$9.33	$10.64	13%	2,458	2,428	3,009	3,009	2,544	2,544
72	67	265	$9.33	$10.64	12%	2,269	2,241	2,778	2,778	2,349	2,349
					100%	22,253	21,519	26,666	26,666	22,548	22,548
W/PROJ =	73 (70 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
73	68	300	$9.09	$10.46	7%	1,291	1,286	1,594	1,594	1,348	1,348
73	68	300	$9.09	$10.46	13%	2,397	2,388	2,960	2,960	2,503	2,503
73	68	300	$9.09	$10.46	12%	2,212	2,205	2,732	2,732	2,310	2,310
					100%	2.101	21,420	26,544	26,544	22,445	22,445
W/PROJ =	74 (71 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
74	69	300	$8.91	$10.25	7%	1,264	1,260	1,561	1,561	1,320	1,320
74	69	300	$8.91	$10.25	13%	2,348	2,340	2,900	2,900	2,452	2,452
74	69	300	$8.91	$10.25	12%	2,167	2,160	2,676	2,676	2,263	2,263
					100%	21,981	21,301	26,396	26,396	22,320	22,320
W/PROJ =	75 (72 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
75	70	300	$8.73	$10.05	13%	2,301	2,293	2,842	2,842	2,403	2,403
75	70	300	$8.73	$10.05	12%	2,124	2,117	2,623	2,623	2,218	2,218
					100%	21,867	21,187	26,254	26,254	22,200	22,200
W/PROJ =	76 (73 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
76	71	325	$8.55	$9.90	13%	2,255	2,260	2,801	2,801	2,368	2,368
76	71	325	$8.55	$9.90	12%	2,082	2,086	2,585	2,585	2,186	2,186
					100%	21,778	21,123	26,175	26,175	22,134	22,134
W/PROJ =	77 (74 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
77	72	325	$8.39	$9.71	13%	2,212	2,217	2,747	2,747	2,323	2,323
77	72	325	$8.39	$9.71	12%	2,042	2,046	2,536	2,536	2,144	2,144
					100%	21,695	21,039	26,072	26,072	22,046	22,046
W/PROJ =	78 (75 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
78	73	325	$8.36	$9.68	13%	2,205	2,209	2,738	2,738	2,315	2,315
78	73	325	$8.36	$9.68	12%	2,035	2,039	2,527	2,527	2,137	2,137
					100%	21,680	21,025	26,054	26,054	22,031	22,031
W/PROJ =	79 (76 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333

65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
79	73	325	$8.36	$9.68	13%	2,205	2,209	2,738	2,738	2,315	2,315
79	73	325	$8.36	$9.68	12%	2,035	2,039	2,527	2,527	2,137	2,137
					100%	21,680	21,025	26,054	26,054	22,031	22,031
W/PROJ =	80 (77 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
80	74	325	$8.36	$9.68	13%	2,205	2,209	2,738	2,738	2,315	2,315
80	74	325	$8.36	$9.68	12%	2,035	2,039	2,527	2,527	2,137	2,137
					100%	21,680	21,025	26,054	26,054	22,031	22,031
W/PROJ =	81 (78 + 3 FT TIDE)										
DEPTH	DRAFT	VESSEL	PER TON								
59	55	150	$13.12	$14.34	24%	6,384	6,044	7,489	7,489	6,333	6,333
65	60	200	$11.05	$12.35	44%	9,817	9,498	11,770	11,770	9,952	9,952
75	70	300	$8.73	$10.05	7%	1,239	1,235	1,530	1,530	1,294	1,294
81	75	325	$8.36	$9.68	13%	2,205	2,209	2,738	2,738	2,315	2,315
81	75	325	$8.36	$9.68	12%	2,035	2,039	2,527	2,527	2,137	2,137
					100%	21,680	21,025	26,054	26,054	22,031	22,031

TABLE E-23 TRANSPORTATION COSTS FROM ALASKA

Alaska, No ANWR, WEFA Projection

USABLE DEPTH (INC.TIDE)	MAX. OP. DRAFT	PCT. OF	1,000 METRIC TONS					
90	84	100%	8,468	5,148	3,168	1,836	1,468	1,468

CHANNEL DEPTH	MAX. DRAFT	OPTIM. VESSEL	COST PER TON 2000	COST PER TON 2010	CHANNEL DEPTH	CONSTRAINED CARGO COST 2000	2010	2020	2030	2040	2050
63	59	200	$7.28	$8.27	63	61,679	42,583	26,205	15,187	12,143	12,143
64	60	200	$7.11	$8.07	64	60,183	41.550	25,569	14,819	11,848	11,848
65	60	200	$6.94	$7.88	65	58,758	40,566	24,964	14.468	11.568	11.568
66	61	200	$6.78	$7.70	66	57,398	39,628	24,386	14,133	11,300	11,300
67	62	230	$6.55	$7.54	67	55,495	38,809	23,882	13,841	11,067	11,067
68	63	230	$6.41	$7.37	68	54.251	37,938	23.347	13.530	10.818	10,818
69	64	230	$6.27	$7.21	69	53,061	37,106	22,835	13,234	10,581	10,581
70	65	265	$6.07	$7.07	70	51,395	36,410	22,406	12,986	10,383	10,383
71	66	265	$5.94	$6.92	71	50,300	35,635	21,929	12,709	10,162	10,162
72	67	265	$5.82	$6.78	72	49,251	34,891	21,471	12,444	9,950	9,950
73	68	265	$5.75	$6.71	73	48,726	34,520	21,243	12,311	9,844	9,844
74	69	265	$5.75	$6.71	74	48,726	34,520	21,243	12,311	9,844	9,844
75	70	265	$5.75	$6.71	75	48,726	34,520	21,243	12,311	9,844	9,844
76	71	265	$5.75	$6.71	76	48,726	34,520	21,243	12,311	9,844	9,844
77	72	265	$5.75	$6.71	77	48,726	34,520	21,243	12,311	9,844	9,844

TABLE E-24 ANNUALIZATION - CRUDE TRANSPORTATION COSTS

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CRUDE ANNUALIZATION, WEFA FORECAST

7.750%
50

Depth	60	64	65	66	67	68	69	70	71	72	73	74	75	76	77
2000	138,333	125,341	123,001	120,764	117,772	115,710	113,735	112,101	111,243	110,734	110,239	109,789	109,394	109,064	109,064
2010	170,646	156,743	153,795	150,977	148,652	146,024	143,505	141,726	140,065	139,129	138,442	137,589	136,974	136,278	136,278
2020	185,129	170,235	167,121	164,143	161,693	158,916	156,255	154,279	152,218	151,056	150,203	149,145	148,381	147,517	147,517
2030	177,724	163,495	160,540	157,714	155,391	152,756	150,230	148,305	146,191	145,001	144,127	143,042	142,258	141,369	141,369
2040	181,062	166,381	163,317	160,387	157,979	155,247	152,628	150,614	148,363	147,109	146,183	145,034	144,191	143,230	143,230
2050	181,062	166,381	163,317	160,387	157,979	155,247	152,628	150,614	148,363	147,109	146,183	145,034	144,191	143,230	143,230
PRES. VALUE	2,134,837	1,957,598	1,921,353	1,886,697	1,855,245	1,822,986	1,792,073	1,768,946	1,747,494	1,735,350	1,726,128	1,715,097	1,706,948	1,698,005	1,698,005
EQ. ANNUAL	$169,508	$155,435	$152,557	$149,805	$147,308	$144,747	$142,292	$140,456	$138,753	$137,788	$137,056	$136,180	$135,533	$134,823	$134,823
SAVINGS		$14,073	$16,951	$19,703	$22,200	$24,761	$27,216	$29,052	$30,755	$31,720	$32,452	$33,328	$33,975	$34,685	$34,685

These costs are then annualized to determine an equivalent annual transportation cost for each trade route. Table E-24 also provides the total annualized costs for all three trade routes.

Problems and Needs

The primary problem and need for this project is to provide more efficient transportation of crude oil to the Port of Long Beach, Berth 121, which supplies a large percentage of crude petroleum to southern California refineries. As crude petroleum imports shift from Alaskan to more distant sources, transportation costs become a larger percentage of the total cost of the delivered product. For example, the transportation cost per metric ton for Alaskan crude oil transported on a 200,000 DWT tanker is estimated at approximately $7.28; for oil arriving from the Persian Gulf it is $16.18. Use of larger, more efficient, tankers (say, 265,000 DWT) would reduce transportation costs for Alaskan crude oil by as much as $1.53 per metric ton while cost reductions would be as much as $5.18 per metric ton for the longer Persian Gulf trade route.

There are larger, more efficient vessels in the existing tanker fleet than can be accommodated fully loaded at Berth 121; there are thus potential cost savings to be realized at the present time. Savings would increase over the next 50 years as Persian Gulf and Far East oil becomes a larger portion of the total throughput of this facility. It is therefore appropriate to consider development of this Increment of navigation improvements and to calculate projected costs and benefits from 2000 to the end of the project's economic life in 2050.

PLAN FORMULATION

Planning Objectives

The NED Planning Objective for this project is to maximize the efficiency of commercial navigation operations for crude oil trade through the Port of Long Beach. Other planning objectives relate to the long-term needs of both ports to meet projected cargo demands. In addition, preservation of environmental resources and attributes were project objectives.

Plan Development

Plans were developed to meet the objectives stated above, consistent with the Port's Master Plan for facility expansion. No attempt was made to redefine the land configurations or uses adopted by the Ports for the Master Plan because these decisions reflect individual Port's needs, priorities, and relationships with other terminal operator, infrastructure facilities, and surrounding communities.

ALTERNATIVE PLANS

Chapter IV of the Main Report presents information on the formulation of alternative plans. In general, the formulation focuses on channel deepening as the only viable alternative and considered several alternatives for disposal of dredged material including beneficial uses. The Federal project would be limited to dredging for the purpose of improving navigation channels. All other project features, such as fill and terminal build-out would be a local responsibility. Given this limitation of project scope, the following alternatives were evaluated: (1) dredging with disposal in landfill areas designated for future development; (2) dredging with disposal at several ocean borrow pit sites; and (3), dredging with disposal at LA-2, an EPA approved offshore ocean disposal site. All alternatives would have identical navigation benefits; the least-cost alternative would therefore be the NED Plan.

PLAN FEATURES

The primary project features include dredging the approach and entrance channels, disposal at one of the sites described in the following paragraphs, navigation aids, berth and wharf improvements, and design and supervision.

Ocean Disposal

Ocean disposal would be at an the EPA-approved LA-2 ocean disposal site. Material to be dredged for this project is of generally good quality, therefore, it is assumed that LA-2 would be acceptable. This site was used in developing the cost for ocean disposal.

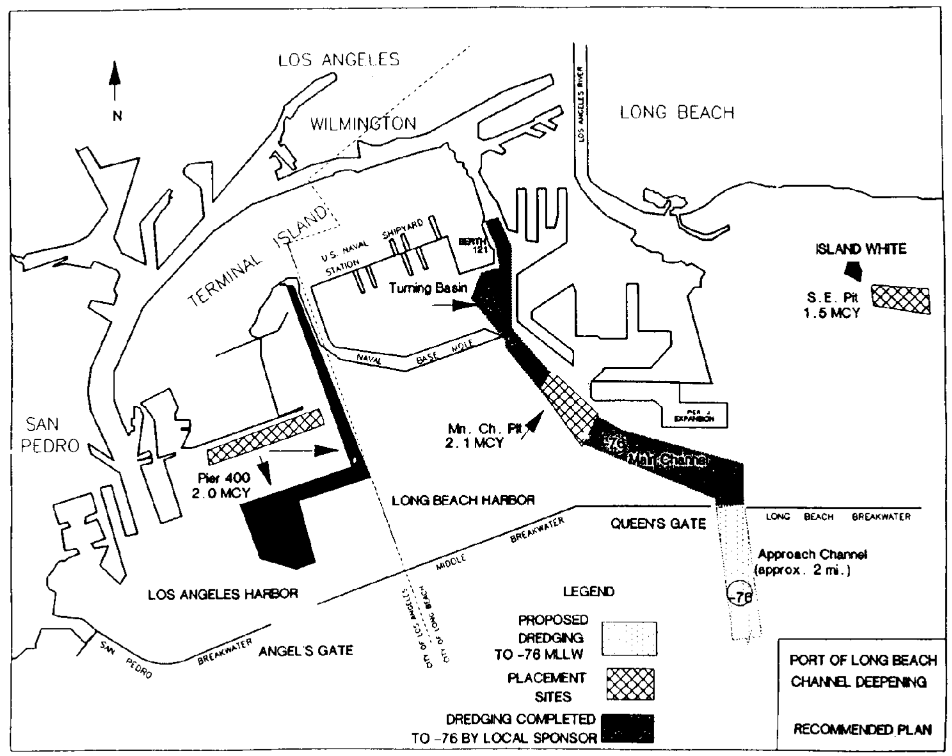
Ocean Pit Disposal

Disposal in several man made pits in the harbor floor was also considered. The location and relative volumes of these pits are given in Figure E-6, below.

Pier 400 Landfill

The Port of Los Angeles has expressed a desire to use up to 2.0 million cubic yards of material for their Pier 400 landfill project. This project has been approved and is currently under construction. The dredged material would be used in place of material from other sources.

Figure E-6 Pit Locations and Volumes



Navigation Aids

Correspondence with the U.S. Coast Guard, Eleventh District, has indicated that construction of this project will require relocation of two buoys in the entrance channel and one buoy in the approach. Four new buoys would be established in the approach channel.

Berthing Area and Wharf Facilities

The existing dimensions of Berth 121 are 76 feet deep (at MLLW), 200 feet wide, and over 1200 feet long. The berth presently supports liquid bulk vessels such as the 267,000 DWT ARCO Spirit, with an overall length of 1100 feet, beam of 178 feet, and loaded draft of 67 feet.

The Berth 121 wharf contains pumps and ladders which support offloading of petroleum from deep-draft liquid bulk vessels. The Port of Long Beach has indicated that there is no need to modify the existing wharf facilities. The receiving tank capacity will be increased with or without the project, however some expansion is required beyond this improvement for offloading vessels larger than 265kDWT, and these are discussed below.

Associated Features

The only associated features that will be required to realize the project benefits are some additional landside tank storage. Storage capacity of 1.4 million barrels presently exists for unloading vessels. These tanks are located on Pier E adjacent to Berth 121 and at existing storage facilities in the City of Carson (Figure E-7). The existing capacity is adequate to unload vessels delivering about 200,000 Metric Tons of crude. Accordingly, Table E-25 shows the additional storage and costs for providing the storage that would be necessary for vessels bringing in crude deliveries greater than the existing capacity. These would be built on land owned by Arco Terminal Services and made available to the users of Berth 121. These costs have E&D and S&A built-in, and are included, as applicable to the costs for alternative channel depths depending on design vessel and delivery volumes. Consequently, these costs do not increase smoothly with channel depth, but reflect incremental jumps at certain depths. This is because storage tanks are generally built to a standard volume of about 250,000 or 500,000 barrels, and when one tank reaches capacity, another tank is required, even if the vessel offloading needs are less than the total tank capacity.

Figure E-7 Location of Landside Tanks and Pipelines

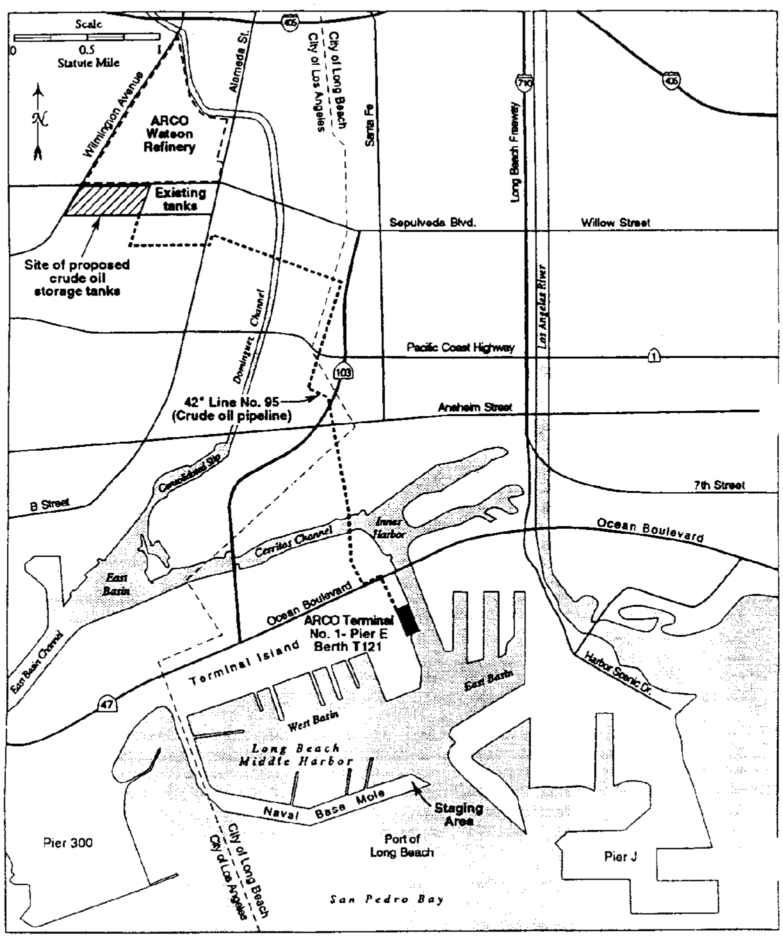


Table E-25. ASSOCIATED COSTS FOR TANK STORAGE

CHANNEL DEPTH (FT MLLW)	DEPTH WITH TIDE (FT MLLW)	OPERATING VESSEL (1,000 DWT)	VESSEL DELIVERY (1,000 MT)	TOTAL BARRELS (1,000 BBL)	ADDED CAPACITY NEEDED (1,000 BBL)	ADDED TANK CAPACITY (1,000 BBL)	TOTAL COST ($1,000)
69	72	265	226	1,626	226	250	5,750
70	73	300	247	1,777	377	500	10,500
71	74	300	252	1,813	413	500	10,500
72	75	300	257	1,849	449	500	10,500
73	76	325	275	1,978	578	750	15,250
74	77	325	280	2,014	614	750	15,250
75	78	365	304	2,187	787	1,000	20,000
76	79	365	310	2,230	830	1,000	20,000
77	80	365	315	2,266	866	1,000	20,000
78	81	365	315	2,266	866	1,000	20,000

(a) 7.19425 Bbl/MT
(b) Cost include $1 million for additional piping.

Dredge Material Quantities

Table E-26 presents the volume of material needed to be dredged based on existing conditions and pre-Pier J construction. The volumes shown for existing conditions reflect new dredging needed to complete navigation channels at various depths (primarily the approach and entrance channel seaward of the breakwater), while the differences between the pre-Pier J estimates and existing conditions (the main channel inside the breakwater) reflect the channel dredging completed to minimum depth of -76 feet, MLLW by the Port of Long Beach as part of the Pier J expansion project, which would be considered for credit desired by POLB.

The volumes shown in Table E-26 are based on the channel dimensions required using the most efficient design vessel for each depth. (The selection of these vessels is presented later in this Economics appendix.) A dredge cut with side slopes of 1 vertical to 3 horizontal was used for channel sides, except at the Navy mole and berthing area where 1 on 1 slopes were considered stable. Overdepth dredging tolerance was designed at two feet for all areas of the project.

These calculations were done using three sources of hydrographic data: predredge hydrographic data for the Port of Long Beach Pier J Expansion project, National Oceanic and Atmospheric Administration (NOAA) bathymetric charts, and the November 1994 hydrographic survey conducted by Sea Surveyor, Inc.

Table E-26 DREDGE VOLUMES

PROJECT DEPTH (FT. MLLW)	DESIGN VESSEL (1,000 DWT)	PRE-PIER J TOTAL DREDGING (1,000 CY)	EXISTING CONDITIONS NEW DREDGING (1,000 CY)	DREDGING COMPLETED BY POLB (1000 CY)
66	265	3,213	1,180	2,033
69	265	5,174	1,986	3,188
72	325	8,156	3,423	4,733
73	325	9,141	3,867	5,274
74	325	10,055	4,350	5,705
75	325	10,896	4,900	5,996
76	325	11,914	5,571	6,343
77	325	13,793	6,749	7,044
78	325	14,732	7,926	6,806

DEVELOPMENT OF FINAL ALTERNATIVE PLANS

The development of the final alternative plans to meet the established planning objectives is based on further consideration of the designed channel requirements and selected disposal options generated in the previous sections. The development of the final plans includes: (1) further analysis of the channel depth to define the navigation improvement dimensions associated with meeting the intent of optimizing the first planning objective; and (2) based on dredge volume requirement associated with the optimum channel, further analysis of the disposal options to develop a final array of plans that further addresses the planning objectives and other criteria.

Optimization of Channel Depths

In accordance with Corps of Engineers planning guidance for deep draft navigation improvements, the optimization of channel depths involves analyzing the cost and benefits of alternative channel designs and disposal options to determine the plan which maximizes the Net Economic Development Benefits to the Nation.

The total cost of the alternative plans includes all costs necessary for implementing the project including dredging and disposal of material; any real estate requirements and additional requirements such as diking or relocation of utilities; requirements for mitigation of impacts; and associated items required for the project such as berth and wharf modifications or terminal facilities required to realize the benefits of the project. In general, the benefits of deep draft navigation plans is associated with transportation savings in moving commerce.

Dredging Completed By POLB

In accordance with Section 4 of the 1988 Water Resources Development Act and the Port of Long Beach's desire to receive credit for partial dredging they completed of any Federal navigation improvements that may result from this study, the optimization of the navigation improvements must consider total cost of required general navigation features assuming the Federal Government had performed the work. This requires consideration of conditions prior to the work completed by the Port of Long Beach including Pre-Pier J project bathymetry, and also requires consideration of all viable disposal options. It is noted that the actual cost to the Port of Long Beach in completing the channel dredging included costs for diking to create landfill, and mitigation associated with the landfill. Consequently, the actual cost of the general navigation features was considerably higher than the options for disposal selected above. For the purposes of optimization and determination of credit, the most cost-effective disposal option is assumed in this analysis.

Optimization Approach

The approach taken to optimize the channel depths for the Port of Long Beach is based on the following considerations:

1. Dredging requirements are based on Pre-Pier J conditions, and will include dredging needed to provide the designed alternative channel dimensions for the main channel and turning basin, as well as the approach and entrance channels.

2. A single disposal plan using the cost for placing the material in the energy island pits will be used for optimizing channel dimensions.

The latter consideration is considered acceptable approach based on the following reasons:

- The cost for dredging and disposal at the final alternative disposal sites selected in the previous Section are

essentially the same, except for the LA-2 site which is considerably higher and would therefore not be the least costly plan associated with the optimum plan.

• Any additional cost required by the Port of Los Angeles for placement of material in Pier 400 would be paid for by the Port of Los Angeles. There is no increase NED cost for this option above the cost of the pit disposal options.

• There is adequate total volume available in the final selected disposal site options to accommodate disposal of all dredged material including dredging completed by the Port of Long Beach.

• There is no mitigation costs associated with any of the selected disposal options that would increase the cost of one site over another site.

• There are no additional NED benefits associated with any of the disposal options that would impact on optimization.

Based on the above, the optimization of the channel dimensions includes the development of alternative plan costs and benefits, and an economic analyisis to determine depth at which the net National Economic Development Benefits are maximized.

PROJECT COST ESTIMATES

Construction Methods

Pier 400 Placement

For placement at Pier 400, a hopper dredge would be used and the material dumped into an approved channel area in the Port of Los Angeles. Concurrent Federally authorized dredging operations at the Port of Los Angeles will be creating new channels and landfill for Pier 400 using an electric hydraulic pipeline dredge. Placement of the Long Beach material in front of this dredge will allow it to be bypassed into the landfill area by pipeline through this dredge.

Long Beach Main Channel Pit

For disposal in the Main Channel Pit, a hopper dredge would be used almost exclusively and the material would be bottom-dumped directly into the pit. Cutter-suction pipeline dredges were considered but rejected for two main reasons. First, they are not very suitable for open ocean operations outside the breakwater due to the effects of wave action on the pumpout pipeline and connections. Second, they are not easily moved, and would have a greater impact on vessel traffic at both the dredge and discharge areas.

Energy Island Pit Placement

For disposal in the Energy Island pits, a hopper dredge would be used almost exclusively and the material would be bottom-dumped directly into the pits. Cutter-suction pipeline dredges were considered but rejected for the same reasons indicated in the previous paragraph plus the fact that the pumping distance to the pits would significantly increase the dredging cost.

LA-2 Placement

For placement at LA-2, a hopper dredge would be used almost exclusively, and the material would be bottom dumped over the LA-2 site. Cutter suction pipeline dredging is not feasible for this distance to the placement site.

General Navigation Features

The following provides cost estimates for dredging and disposal of constructing the alternative designed channels. Details are presented in the Cost Estimates Appendix. The cost estimates are based on October 1995 Price Levels. The unit dredging costs are based on recent bids for similar work in both Los Angeles and Long Beach Harbors, interviews with local dredging contracting firms, and analyses using the Corps of Engineers Dredge Estimating Program.

The cost estimates include contingencies for each cost item based on an analysis of the accuracy of information used for the design and costs. The cost estimate also includes the estimated cost for mobilization and demobilization of equipment, Engineering and Design, and Supervision and Administration of construction.

Mobilization & Demobilization. Costs for Mobilization and Demobilization included hopper dredge and associated equipment, and a survey vessel and associated equipment.

Real Estate Aquisition. Channel and disposal lands are within the jurisdiction of the Port of Long Beach, the City of Long Beach, and the State Lands Commission. There are no direct costs for real estate aquisition or changes in value associated with the plans. However, about 2 acres would be required for a staging area associated with dredging the remaining channel. The staging area is expected to be located at the end of the Navy mole, which will be arranged by the Port of Long Beach. It is noted that for the total plan it is assumed about 4 acres would be needed for additional equipment or to reflect the additional time required to dredge inside and outside the breakwater.

Engineering & Design. Engineering and Design (E&D) includes both Pre-construction (Planning, Engineering and Design Phase of Project Development) and during construction, and includes both channel and disposal area design.

Supervision and Administration (S&A). S&A costs were estimated based on approved rates established for construction management.

Aids to Navigation. The costs for aids to navigation are based on information from the U.S. Coast Guard presented in Appendix A.

Associated Costs and Port Facilities

Associated Costs were defined as those costs necessary for implementation of the plan and realization of the benefits, but not part of the GNF. The only associated costs are for some additional landside tank storage, and these costs were provided to the Port by Arco Terminal Services, the owner of the tanks. Storage capacity of 1.4 million barrels presently exists for unloading vessels. These tanks are located on Pier E adjacent to Berth 121 and at existing storage facilities in the City of Carson (Figure E-7). The existing capacity is adequate to unload vessels delivering about 200,000 Metric Tons of crude. Accordinglyly, Table E-27 shows the additional storage and costs for providing the storage that would be necessary for vessels bringing in crude deliveries greater than the existing capacity. These would be built on land owned by Arco Terminal Services and made available to the users of Berth 121. These costs have E&D and S&A built-in, and are included, as applicable to the costs for alternative channel depths depending on design vessel and delivery volumes. Consequently, these costs do not increase smoothly with channel depth, but reflect incremental jumps at certain depths. This is because storage tanks are generally built to a standard volume of about 250,000 to 500,000 barrels, and when one tank reaches capacity, another tank is required, even if the vessel offloading needs are less than the total tank capacity.

Table E-27. ASSOCIATED COSTS FOR TANK STORAGE

CHANNEL DEPTH (FT MLLW)	DEPTH WITH TIDE (FT MLLW)	OPERATING VESSEL (1,000 DWT)	VESSEL DELIVERY (1,000 MT)	TOTAL BARRELS (1,000 BBL)	ADDED CAPACITY NEEDED (1,000 BBL)	ADDED TANK CAPACITY (1,000 BBL)	TOTAL COST ($1,000)
69	72	265	226	1,626	226	250	5,750
70	73	300	247	1,777	377	500	10,500
71	74	300	252	1,813	413	500	10,500
72	75	300	257	1,849	449	500	10,500
73	76	325	275	1,978	578	750	15,250
74	77	325	280	2,014	614	750	15,250
75	78	365	304	2,187	787	1,000	20,000
76	79	365	310	2,230	830	1,000	20,000
77	80	365	315	2,266	866	1,000	20,000
78	81	365	315	2,266	866	1,000	20,000

(a) 7.19425 Bbl/MT
(b) Cost include $1 million for additional piping.

First Costs

Tables E-28, E-29, and E-30, show the total first cost for a Total Plan by depth including new dredging required and channel work associated with dredging completed by the Port of Long Beach with least cost disposal; Remaining Plan by depth which includes the costs required to complete channel dredging based on existing conditions with least costly disposal; and Remaining Plan which includes costs required to complete channel dredging based on existing conditions with disposal at LA-2. The costs are based on October 1995 price levels and include the cost of the general navigation features and associated costs.

Annual Costs

Annualized costs by incremental depths are also presented in Tables E-28, E-29, and E-30. The annual costs are based on an interest rate of 7 3/4% and an economic life of 50 years. Annual costs include interest during construction, interest and amortization, and operation and maintenance.

Operations and Maintenance

Operations and maintenance is limited to the channel areas only. Historically, there has been very little sedimentation of channels in San Pedro Bay, and due to the depth of the channel and surrounding bathymmetry, there is very little movement of sediment in the project area. However, it is expected that periodic surveys will be required to ensure proper channel dimensions are maintained. However, as these surveys are presently required for the existing Federal navigation project channels, the cost can be considered negligible.

Details on the cost estimate are presented in Appendix C.

Table E-28 First Cost and Annual Cost of Total Plan By Depth

FIRST COSTS ($1000)	60	63	66	69	70	71	72	73	74	75	76	77	78
GNF													
Mob & Demob	0	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520
Dredging	0	4,074	7,952	12,806	16,392	18,407	20,194	22,624	24,886	26,968	29,487	34,137	36,462
Deeper than 45'	0	2,817	5,400	9,577	13,001	14,793	16,415	18,626	20,668	22,455	24,681	29,037	30,913
Overdepth (2')	0	1,257	2,552	3,228	3,391	3,614	3,776	3,998	4,218	4,512	4,806	5,100	5,548
Mit. Disposal	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	4,074	7,952	12,806	16,392	18,407	20,194	22,624	24,886	26,968	29,487	34,137	36,462
LERRDS		120	120	120	120	120	120	120	120	120	120	120	120
ASSOC. COSTS ($1000)													
Berthing Area	0	0	0	0	0	0	0	0	0	0	0	22	44
Overdepth (2')	0	0	0	0	0	0	0	0	0	0	0	44	44
Tankage	0	0	0	5750	10500	10500	10500	15250	15250	20000	20000	20000	20000
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL ($1000)	0	0	0	5750	10500	10500	10500	15250	15250	20000	20000	20067	20089
AIDS to NAV. ($1000)	0	110	110	110	110	110	110	110	110	110	110	110	110
SUBTOTAL ($1000)	0	6,824	10,702	21,306	29,642	31,657	33,444	40,624	42,886	49,718	52,237	56,953	59,300
E & D ($1000)	0	409	635	926	1,141	1,262	1,369	1,515	1,651	1,776	1,927	2,210	2,351
S & A ($1000)	0	273	423	617	761	841	913	1,010	1,101	1,184	1,285	1,473	1,567
TOTAL FIRST COST	0	7,506	11,760	22,849	31,544	33,760	35,726	43,149	45,638	52,677	55,449	60,637	63,218
IDC	0	529	829	1,65.	2,297	2,453	2,592	3,148	3,324	3,853	4,048	4,414	4,596
TOTAL COST ($1000)	0	8,035	12,590	24,500	33,841	36,214	38,318	46,298	48,961	56,530	59,497	65,051	67,814
INTEREST & AMOR.													
(7 3/4%, 50 yrs)	0	638	1,000	1,945	2,687	2,875	3,042	3,676	3,888	4,489	4,724	5,165	5,385
O & M													
(0.5% of Dikes)	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL ANNUAL COST	0	638	1,000	1,945	2,687	2,875	3,042	3,676	3,888	4,489	4,724	5,165	5,385

Table E-29 First Costs and Annual Costs of Remaining Channel Work With Least Costly Disposal by Depth

FIRST COSTS ($1000)	60	63	66	69	72	73	74	75	76	77	78
GNF											
Mob & Demob	0	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Dredging	0	1,366	2,921	4,915	8,472	9,571	10,766	12,128	13,788	16,703	19,617
Deeper than 45'	0	871	1,111	2,429	5,436	7,057	7,290	9,100	10,467	12,345	14,811
Overdepth (2')	0	495	1,809	2,486	3,036	2,513	3,476	3,027	3,321	4,358	4,806
Mit. Disposal	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	1,366	2,921	4,915	8,472	9,571	10,766	12,128	13,788	16,703	19,617
LERRDS		60	60	60	60	60	60	60	60	60	60
ASSOC. COSTS ($1000)											
Berthing Area	0	0	0	0	0	0	0	0	0	22	44
Overdepth (2')	0	0	0	0	0	0	0	0	0	44	44
Tankage	0	0	0	5,750	10,500	15,250	15,250	20,000	20,000	20,000	20,000
Other	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL ($1000)	0	0	0	5750	10500	15250	15250	20000	20000	20067	20089
AIDS to NAV. ($1000)	0	110	110	110	110	110	110	110	110	110	110
SUBTOTAL ($1000)	0	2,616	4,171	11,915	20,222	26,071	27,266	33,378	35,038	38,019	40,956
E & D ($1000)	INCL PED)	806	865	945	1,087	1,131	1,179	1,234	1,300	1,419	1,537
S & A ($1000)	0	163	259	385	609	678	753	839	950	1,131	1,316
TOTAL FIRST COST	0	3,587	5,295	13,245	21,918	27,880	29,199	35,450	37,288	40,570	43,809
IDC	0	203	323	923	1,567	2,020	2,113	2,587	2,715	2,946	3,174
TOTAL COST ($1000)	0	3,789	5,618	14,169	23,485	29,901	31,312	38,037	40,004	43,516	46,983
INTEREST & AMOR.											
(7 3/4%, 50 yrs)	0	301	445	1,125	1,865	2,374	2,486	3,020	3,176	3,455	3,730
O & M											
(0.5% of Dikes)	0	0	0	0	0	0	0	0	0	0	0
TOTAL ANNUAL COST	0	301	446	1,125	1,865	2,374	2,486	3,020	3,176	3,455	3,730

Table E-30 First Costs and Annual Costs of Remaining Channel Work With Disposal at LA-2 by Depth

FIRST COSTS ($1000)	60	63	66	69	72	73	74	75	76	77	78
GNF											
Mob & Demob	0	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Dredging	0	2,004	4,283	7,209	12,425	14,037	15,791	17,787	20,223	24,497	28,771
Deeper than 45'	0	1,278	1,630	3,563	7,973	10,351	10,693	13,347	15,352	18,106	21,723
Overdepth (2')	0	726	2,654	3,646	4,453	3,686	5,098	4,440	4,871	6,391	7,049
Nit. Disposal	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	2,004	4,283	7,209	12,425	14,037	15,790	17,787	20,223	24,497	28,771
LERRDS		60	60	60	60	60	60	60	60	60	60
ASSOC. COSTS ($1000)											
Berthing Area	0	0	0	0	0	0	0	0	0	33	65
Overdepth (2')	0	0	0	0	0	0	0	0	0	65	65
Tankage	0	0	0	5,750	10,500	15,250	15,250	20,000	20,000	20,000	20,000
Other	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL ($1000)	0	0	0	5759	10500	15250	15250	20000	20000	20098	20130
AIDS to NAV. ($1000)	0	110	110	110	110	110	110	110	110	110	110
SUBTOTAL ($1000)	0	3,254	5,533	14,209	24,175	30,537	32,291	39,037	41,473	45,845	50,152
E & D ($1000) INCL PED)		430	519	636	845	909	979	1,059	1,157	1,331	1,504
S & A ($1000)	0	205	345	529	858	959	1,070	1,196	950	1,624	1,896
TOTAL FIRST COST	0	3,889	6,397	15,374	25,878	32,406	34,339	41,292	43,579	48,800	53,551
IDC	0	252	429	1,101	1,874	2,367	2,503	3,025	3,214	3,553	3,887
TOTAL COST ($1000)	0	4,141	6,826	16,476	27,751	34,772	36,842	44,317	46,793	52,353	57,438
INTEREST & AMOR.											
(7 3/4%, 50 yrs)	0	329	542	1,308	2,203	2,761	2,925	3,519	3,715	4,157	4,561
O & M											
(0.5% of Dikes)	0	0	0	0	0	0	0	0	0	0	0
TOTAL ANNUAL COST	0	329	542	1,308	2,203	2,761	2,925	3,519	3,715	4,157	4,561

DESIGNATION OF THE NED PLAN AND RECOMMENDED PLAN

Economic Analysis

An economic analysis of the Total Plan costs and benefits at various incremental depths was conducted by comparing the cost for implementation with expected benefits of the plan on an annual basis. This determines the optimized NED depth based on maximizing net NED Benefits. The costs used in this analysis include the volume of dredging done by the POLB inside the breakwater assuming Pre-Pier J expansion conditions, and the least costly disposal method. This analysis allows selecting the optimized depth of the channel improvements that the Corps of Engineers would have chosen for the Total NED Plan prior to the work completed by POLB. Therefore, it establishes a basis for determining the Federal cost of the Total NED Plan, and any credit that POLB would be eligible for with respect to the Federal share of the work they completed on the Total NED Plan.

Table E-31 displays the annualized construction costs and transportation savings for the range of channel depths, and computes net NED benefits. This table shows that deepening to -76 feet MLLW maximizes the NED benefits.

Table E-31 NED Depth Optimization

POLB ECONOMIC ANALYSIS
NED DEPTH OPTIMIZATION
INCLUDES COSTS OF PORTS ADVANCE DREDGING

VOLUME Crude (80%)
14-Jun-95
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($1,000)	60	63	69	70	71	72	73	74	75	76	77	78
COSTS												
First Cost	0	7,506	22,849	31,544	33,760	35,726	43,149	45,638	52,677	55,449	60,637	63,218
Total Annual Cost	0	638	1,945	2,687	2,875	3,042	3,676	3,888	4,489	4,724	5,165	5,385
Transportation Cost	169,508	156,835	142,292	140,456	138,753	137,788	137,056	136,180	135,533	134,823	134,823	134,823
BENEFITS												
Transportation Savi	0	12,673	27,216	29,052	30,755	31,720	32,452	33,328	33,975	34,685	34,685	34,685
W/O Location Benefits												
NET BENEFITS	0	12,035	25,270	26,365	27,880	28,677	28,776	29,440	29,486	29,961	29,520	29,300
B/C Ratio	0	19.86	13.99	10.81	10.70	10.43	8.83	8.57	7.57	7.34	6.72	6.44

Interest Rate: 7.750%
Project Life: 50 years

NED Analysis

The depth optimization in the previous section showed that a dredge depth of -76' MLLW maximizes net benefits. The NED account table above shows that Alternatives A and B both show maximum annual net benefits, at $31,509,000.

Recommended Plan

The Recommended Plan is Plan A, which is described in detail in the next chapter, but includes the following features:

1. Dredging:Approximately 5.6 MCY of material from channel shown on Figure E-8.

2. Placement of material in Pier 400, and Main channel and Southeast Energy Island Pits

3. Associated Features: Landside tanks required to accommodate the additional deliveries.

The Recommended Plan also includes incorporating the channel deepening work to the optimized channel dimensions completed by the Port of Long Beach as part of their Pier J expansion project, and providing credit as appropriate.

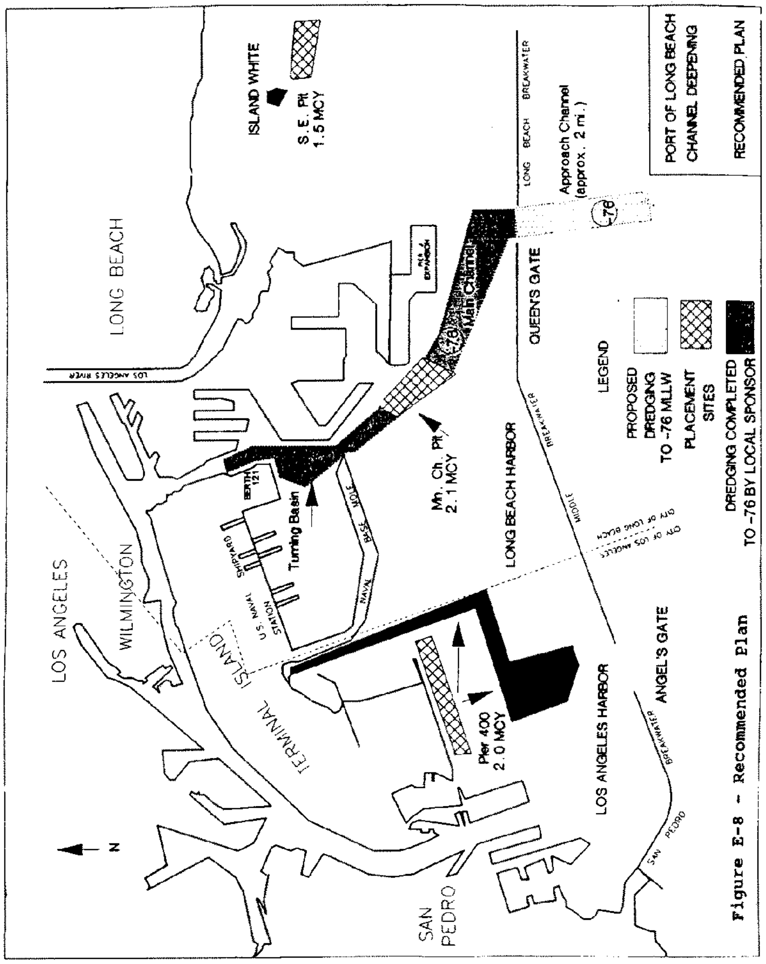

Figure E-8 - Recommended Plan